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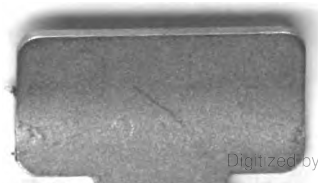
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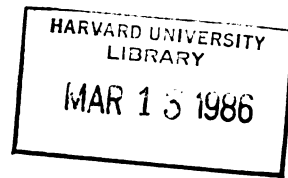
"It will flourish, if naturalists, chemists, antiquaries, philologists, and men of science, in different parts of Asia, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish if such communications shall be long intermitted; and it will die away, if they shall entirely cease.—SIR WM. JONES.

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*A Sketch of the Mahomedan History of Cashmere.—By Lieut.  
D. J. F. NEWALL, of the Bengal Artillery.*

The native authorities consulted in drawing up the following brief sketch of Cashmere History are as follows :

1. The Raja Tarangini (Persian translation of Kalhana pundit carried on to the present day by later hands).
2. The History of Mahomed Azim.
3. The Ayeen Akbarrie of Abul Fazl.
4. The History by Narrain Khol.
5. Ditto by Hyder Malik Chadwanee and several other less well known authorities.

It had been my intention to have commenced the following sketch with the fabulous desiccation of the valley by Kúshyapa, anterior to historical times, as related in the earliest existing chronicle—the Raja Taringini, but as that work has been translated and is accessible to those who take an interest in the subject, I have taken up the history from the point where that ancient record ceases, a continuation of which in the Persian language has, as above remarked, been brought down to the present day.

It must be remarked, however, that according to one Mahomedan author (I will not say authority) the records of the valley extend to a date long anterior to the fabulous Hindu tradition of its desiccation by the Muni Kashypa, an event which, from coincidence in the chronology, seems to point to the Mosaic deluge. The author

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above alluded to\* (Noor-ood-deen) begins his history of Cashmere with the creation, and according to him the valley was visited by Adam after the fall! The descendants of Seth reigned over Cashmere 1110 years, after which it was conquered by Hurrischunder Raja, whose descendants reigned till the deluge, after which event the country was peopled by a tribe from Turkisthan. Moses is said to have died in Cashmere, where he taught the worship of the one God. The people, however, afterwards relapsed into idolatry, a sin which was visited by the local inundation of the country and the tyranny of the demon Juldeo. After the desiccation of the valley by Kushef, fifty-five princes of the Korans reigned 1919 years. According to Bedia-ood-deen (the commentator of Noor-ood-deen,) the country was settled by Solomon, who set up his cousin Isaun as king. The worship of the one God still continued the national religion, till one of the kings lost his life in endeavouring to resist the progress of idolatry, which again gained a footing in the land, and from this time the brahminical faith seems, with one or two intervals of Buddhism, to have prevailed until about the period at which the present sketch commences.

1805 A. D.—About the year of the Hejira 705 Raja Sudeo ascended the throne of Cashmere, a prince of a tyrannical and feeble character, who, in a short time alienated the affections of his subjects by sundry acts of incapacity and oppression. At this period, a certain Mahomedan prince named Shahmir, who claimed a descent from Ali, assuming the disguise of a merchant's son, appeared in the country, and was assigned a village near Baramoola for his residence and support. Ambition seems to have prompted him to this, inasmuch as his grandfather Wuffoor Shah of Sawadgere had prophesied that Shahmir would one day become a king of Cashmere, which, it will hereafter appear, eventually came to pass; one amongst numerous instances of such prophecies containing the conditions of their own fulfilment.

Another chief named Sunkur Chukk, being driven away from Dardao, fled to Cashmere, and there took up his abode with his adherents; and thirdly, prince Ranjpoe, a son of king Yuftun of

\* These facts I derive from Professor Wilson's *Treatise*, Vol. XV. Trans. As. Soc. never having met with the work of Shaik Noor-ood-deen.

Thibet, being forced to fly his country, appeared in Cashmere, and attempted to gain over to his cause Ramchund the hereditary commander-in-chief of the army of Cashmere, which chief assigned to him his fort of Koknigera for his residence. It will be seen that these three worthies either in their own persons or in those of their descendants played conspicuous parts in the history of the country.

Towards the close of Raja Sudeo's reign a Turk, Zoolkudr Khan, invaded Cashmere with an army of 70,000 horse from Kashmir by the Baramoola pass, upon which the cowardly Sudeo immediately fled to Kishtewar. The Turks then sacked the country, where they luxuriated in plenty for six months; after which, provisions failing, they attempted to return, but perished to a man in the snow above the Deosir Pergunnah: previous to this their numbers had been reduced by war and luxury to 50,000. On their departure, anarchy ensued in Cashmere for a time; parties of robbers and independent zemindars infested the country.

On the flight of the king to Kishtewar, Ramchund, the commander-in-chief, had retreated to his fort of Koknigera, where he held his own during the subjugation of the country by the Turks.

The Raja of Thibet, Ranjpoe, deeming this a favourable opportunity of gaining possession of the throne, introduced himself with a few followers in the disguise of merchants into Koknigera, and slew Ramchund, whose daughter Kotereen he married. He then seized the vacant throne of Cashmere, and made Rawanchund, his wife's brother, commander-in-chief, and despatched him to Thibet as viceroy of that country. The fugitive king Sudeo, seeing this state of things, now attempted to return, but, meeting with no encouragement from his former subjects, again fled to Kishtewar and finally vacated his throne after a reign of nineteen years, three months and twenty-five days.

A. D. 1323.—Ranjpoe or Rinshan Shah being now established on the throne, made the prince Shahmir minister, and, although he had raised himself to the dignity of king by an act of violence, seems, when once his power was secure, to have ruled with wisdom and justice, and many acts in which these qualities were exhibited are recorded of him. He appears also to have been troubled with



doubts respecting religion, and the Mahomedan writers relate the following story of his conversion to the religion of Islam. Perceiving the folly of idolatry, he prayed earnestly to God to afford him some guide in his search of truth; it was at length vouchsafed to his troubled mind that the religion of the person who should first meet his sight on arising in the morning was the one it was right for him to adopt. It so happened that the Faqeer Boolbel Shah of Thibet, engaged at his morning prayers, was the first person upon whom his eyes fell. Struck with the sight he requested an explanation, became convinced and accepted the religion of Islam and assumed the name of Sudder-Udeen. Ramchund and many other nobles were converted at the same time.

It is proper to add that the Hindu writers entirely ignore the conversion of Ranjpoe who died after a reign of two and half years, leaving his widow the queen Kotereen, A. D. 1326, regent. This princess now raised to the throne and married Udeen Deo the brother of Sudeo, the issue of which marriage was one son. No sooner had this king mounted the throne than his country was invaded by an army of Turks who, under the command of Urdil, marched across the Pir Pinjal to Hurpore, upon which the timid Udeen Deo fled towards Thibet, but Kotereen with the courage of her race, rallied her forces around her, called in her brother Rawunchund, the commander-in-chief, and the wuzzeer prince Shahmir to her aid, by whose assistance, after several battles, she brought the Turks to terms. It was arranged that the latter should leave the country immediately and be allowed to retire unmolested. Their retreat being effected, the queen recalled Udeen Deo her timid consort, but his subjects, indignant at his desertion of them in the hour of danger, would never pay him the respect due to a sovereign. He died after a reign of fifteen years, leaving queen Kotereen a second time sole regent of the country. A. D. 1341, She now removed her court to the fort of Indr Kote, where she resided in peace for five months, but during this period the eyes of men were gradually turned towards prince Shahmir who had commenced a course of intrigue, the result of which was the merging of the whole real power of the state into his own hands. Still restrained by some scruples of conscience, he at first sent the Queen

proposals of marriage, which being rejected with scorn, he prepared to extort her consent by force of arms and invested Indr Kote with a large army. The heroic Rajpootnee made every effort to defend herself and sustain a siege, but at length, her brother Rawunchund being dead and finding herself unsupported and declining in power, she, in the last extremity, consented to espouse the successful usurper. Upon this, hostilities ceased, and preparations for the marriage were commenced, A. D. 1341, but the devoted princess despairing and indignant, surrounded by her train of maidens, rode slowly forth from the beleaguered fort, advanced into the presence of the usurper, and upbraiding him for his ingratitude and treachery, stabbed herself before him. Thus perished by her own hand the last Hindoo sovereign of Cashmere and Prince Shahmir ascended the throne as Sultan Shums-ood-deen.

#### *Independent Kings.*

Prince Shahmir, usually considered the 1st Mahomedan King of Cashmere, ascended the throne in the year of the Hejira 742, A. D. 1341, and assumed the name of Sultan Shums-ood-deen, but died after a short reign of three and half years. He was succeeded by his eldest son Jumshéd, A. D. 1344, who however after enjoying the throne for little more than a year, was defeated and slain by his younger brother Ala-ood-deen, who forthwith ascended the throne. Of this prince little is recorded except that he reigned in peace for twelve and a half years, and was succeeded by his son Shahab-ood-deen, A. D. 1356, who having repaired the devastations caused by the former invasions of the Turks, which had impoverished the country for the last few reigns, turned his attention to foreign conquest and during the succeeding ten years subdued A. D. 1350, Thibet, Kashgar, Budukshan and Cabul. He then, according to the historian Hyder Malek, with an immense army (of 50,000 horse and 500,000 foot) invaded Hindustan by way of Kishtewar and Nugger Kote, and is said to have worsted Firoz-shah, King of Delhi, in a pitched battle on the banks of the Sutlej, the result of which was to cause that potentate to acknowledge his supremacy. Shahab-ood-deen then returned to Cashmere, where his religious zeal led him to destroy the idol

temples at Bijbiharee and elsewhere, and it was probably under compulsion that the chief of the powerful tribe of Reyna, (Ajil Reyna of the Chunds of the Nargaon Pergunah,) at this time became a convert to the religion of Islam. Sultan Shahab-ood-deen died after a reign of nineteen years and was succeeded by his brother Kootub-ood-deen, A. D. 1376, who appointed Abdie Reyna commander-in-chief. During this reign, the famous Syud Allie Hamadanie arrived in Cashmere, and his advent is recorded in the following couplet which also contains the date, Hejira 790 (A. D. 1388.)

سال تاریخ مقدم اورا جوئی از مقدم شرایف او سنه ۷۹۰

This celebrated Syud was a fugitive from his native city of Hamadan where he had incurred the wrath of Timoor. Seven hundred Syuds are said to have accompanied his flight to Cashmere, where he remained six years and which he named the "Garden of Solomon," (Bagh-i-Soliman.) He died at Puklie whilst on his return to Persia. His son Meer Mahomed Hamadanee, also a fugitive, brought in his train 300 Syuds to Cashmere, where he remained twelve years.

These two immigrations of fugitive Syuds fixed the religion of the country and were doubtless the chief cause of the religious persecutions which ensued in the following reign.

They established shrines all over the country, many of which remain to this day. They originated the sect of "Rishees" or hermits, which are described by Abul Fazl as a very respectable and inoffensive order, in his time some 2,000 in number, living upon fruits and berries and abstaining from sexual intercourse. Their numbers, however, afterwards declined until they became quite extinguished by the courtiers and creatures of the Emperors of Delhi.

Mahomed Azim the historian enumerates many worthies of this sect, a few of the most celebrated of whom I have added in a note, leaving the historian to be consulted in original by such readers as feel interest in the pretended miracles and holy acts of Mahomedan saints. Some of the stories, however, are sufficiently amusing.

To resume—Cashmere having been, previous to this influx of zealots, in a transition state as to religion, the advent of a Mahomedan

saint such as Syud Allie seems to have been hailed with enthusiasm, and proselytism to have commenced in real earnest. Meantime Kootub-ood-deen died after a reign of near sixteen and half years, A. D. 1393, and was succeeded by his son Sultan Sikunder, during whose reign a constant succession of learned doctors appeared in Cashmere, attracted doubtless by the fame of a new Mahomedan acquisition, A. D. 1397. At this time also (H. 800,) Timoor Lung invaded India, and presents passed between him and Sikunder. Preliminaries were arranged between their respective vakeels for a meeting near Attock, and Sikunder had actually set out, but Timoor had already passed on to Samarkand, taking with him a son of Sikunder as a hostage. Partly by the influence of Timoor and partly no doubt urged by the fanatic Moslems who had lately appeared in his country, Sikunder was about this period instigated to religious persecution; he began to throw down the Hindoo temples and images "by fire," and to force his subjects to abjure idolatry: he thereby acquired the surname of "Bhutshikan" or "Iconoclastes." It seems probable that he employed the agency of gunpowder, A. D. 1393, in his destruction of the temples, a present of which, it has been suggested by an author upon Cashmere Antiquities (Cunningham), he might have acquired from Timoor, as it appears established that the use of that explosive was known to the nations of central Asia in the 14th century. Sikunder died after a reign of twenty-five years, nine months, leaving the throne to his son Sultan Allie Shah, (1417) who inheriting to the full his father's fanaticism, but being without his energy and talents, after reigning six years and nine months, left the government in the hands of his brother Zein-ul-ab-ood-deen and set out on a pilgrimage to Mecca. On his arrival however at Jummo, he was dissuaded by his father-in-law, the Rajah of that place, from proceeding further and accordingly commenced his return to Cashmere by way of Pukli, A. D. 1423, but his brother refused to surrender the government, and a severe battle ensued in which the king was taken prisoner, confined, and soon after died, perhaps from poison.

A. D. 1423.—Zein-ul-ab-ood-deen or "Boodshah" now mounted the throne, and soon after invaded Kashgar and Thibet with an army of 100,000 foot and 20,000 horse.

This prince improved the country more than any of his predecessors. He built bridges, towns, and forts, (Zein Kuddul, Zein-pore, Zein Kote, &c.) and erected at Naoshera a noble palace (twelve stories high, each story of fifty rooms): he constructed the Lank island, upon which he built a mosque and a summer-house (to be seen there to the present day) on the site of an ancient temple, whose summit was at that time visible above the waters of the Wuler Lake (1443): he also enlarged and beautified the city of Srinugur his capital. This great prince encouraged literature and the fine arts; he introduced into the country weavers from Turkisthan and wool from Thibet; and many manufactures, such as paper-making, glass-making, book-binding, &c. owe their introduction in Cashmere to his fostering care. He was well versed in the literature of his age, acquired several languages and translated books. He collected a library and invited to his court learned men of all kinds—amongst others Jumal, a Hindustani, became “Kazi” of Cashmere, and a sort of inquisitor general into the religion of Islam. Zein-ul-ab-ood-deen was also a poet and added to his other qualities a love of field sports. The rising power of the Chukk tribe did not escape the penetrating eye of the king who prophesied, they would some day be rulers of Cashmere, a prediction which eventually proved correct.

Altogether Cashmere seems to have made a great step towards an improved civilization during the reign of this great prince, which extended over a period of fifty-two years. He died in 1474, and was succeeded by his son Hyder Shah, A. D. 1474, who after reigning little more than a year was killed by a fall from his palace, A. D. 1475, and was succeeded by his son Sultan Hussan, a prince of a very voluptuous and sensual character. Hitherto a tribute of twelve lakhs of rupees and a thousand horses had been exacted from the surrounding states, which, now encouraged by the king's indolence, asserted their own independence, and thus only Cashmere proper remained to him. However Tazie Khan, his commander-in-chief, invaded the Punjaub with a view of chastising the chief of that country, Tattar Khan, who had afforded aid to the rebels. This king Sultan Hussan reigned twelve years in excess and drunkenness, when he died leaving the throne to his

son Mahomed Shah a child of seven years of age, destined in after life to experience more of the vicissitudes of fortune than usually falls even to the lot of kings. Encouraged by the circumstances of the king's youth, A. D. 1487, (A. H. 893,) his uncle Futteh Shah, the brother of the late king, was tempted to aspire to the throne, and on the pretext of invading Hindustan, he managed to get the king's army under the commander-in chief Mullick Saifdar out of the country, and during the temporary absence of the youthful king, who accompanied the army on the expedition, was appointed viceroy, and was on the point of throwing off his disguise when the sudden return of the king Mahomed Shah disconcerted his projects for the time.

After a short interval however he entered into a secret alliance with Sirung Reigna and Mullick Shums Chukk, chieftains of Cashmere, whose combined forces defeated the king's army under Mullick Saifdar, and forced Mahomed Shah to vacate the throne, after reigning two years and seven months. Futteh Shah thus obtained temporary possession of the throne and made Shums Chukk, commander-in-chief and minister, A. D. 1489. Thus things remained some two and half years, after which a party headed by Meer Syud, Ibrahim Magrey, Mullick Hadjie Padr, and Abdie Reigna, gradually brought together their adherents and defeated Shums-ood-deen Chukk, and his nephew Kajee Chukk, who fled to the Kamraj, where they took refuge in their strongholds, A. D. 1492.

Upon this Mahomed Shah regained his throne and Meer Syud Mahomed and Mullick Moosa Reigna became ministers. Mahomed Shah then followed the Chukks into the Kamraj as far as Sopur, and his army took and destroyed their stronghold of Taragaom. Determined on revenge, however, Shums Chukk still kept the field with a party of horse, and meditated a night attack upon the king who was encamped at Sopur; this project however coming to the king's knowledge, he ordered the bridge over the river Jhelum at that place to be destroyed, and preparations were made to receive the enemy. At the dead of night the Chukks, led by their brave chieftain, swam the river, and fell upon the king's camp. A sanguinary conflict ensued, which, notwithstanding all his efforts,



ended in the defeat of Shums Chukk, who was again forced to seek safety in his mountain fastnesses. Upon learning this disaster, Futteh Shah fled to Hindustan, but soon afterwards returned on the invitation of his victorious nephew. Although thus generously forgiven, this old intriguer soon recommenced his former practices, formed a party and prevailed so far that Mahomed Shah, A. D. 1499, was a second time forced to abandon his capital, and take refuge with Mullick Moosa Reigna, who still held his own estates and maintained a desultory warfare.

Futteh Shah thus, a second time, gained possession of the throne, making his faithful adherent Shums-ood-deen Chukk minister; A. D. 1499, but his enjoyment of it was but brief: Moosa Reigna, rallying his forces, took the field and signally defeated the usurper's army in a pitched battle, taking his opponent Shums Chukk prisoner. So dangerous a rival could not be allowed to live, and accordingly the Chukk was put to death in his prison, after having, it is said, killed no less than sixty of his executioners before he fell, as is related in the following couplet well known in Cashmere legends.

بنگ و بچوب و بخت و بيمت    ملک شمس چک شمت کس را بکشت

A. D. 1501.—Mahomed Shah being absent in the Punjaub, Futteh Shah was suffered by the successful Reigna, after some negotiation to retain the name of king, whilst he himself exercised its real powers for nearly nine years, until about the year 916 H., (A. D. 1510.) Futteh Shah, finding himself a mere puppet, attempted to set up Mullick Ibrahim Magrey in opposition, who however was soon forced to provide for his safety by flight. The tribe of the Dangrees now got the upper hand for the space of forty days, and set up Mullick Asman, but the Chukks, under Kajee Chukk, now aroused themselves and got the better of the Dangrees. A state of anarchy and scramble for power succeeded, in the midst of which Futteh Shah fled as far as Hurepore, on his way to Hindustan, but being there met by Ibrahim Magrey, who professed himself ready to stand by him, he was encouraged to return to the capital, and he reigned one year longer. At length the fugitive monarch Mahomed Shah determined on an effort to regain his throne, collected an army in the Punjaub, and marched, A. D. 1512, towards Cashmere by

the Pymouth, (now Paonch) road. A strong party in Cashmere also, at the head of which were Sunkur and Nusrut Reigna, declared for the legitimate king. Nevertheless Futteh Shah, being supported by Ibrahim Magrey and others, advanced into the Kamraj to meet the enemy; a great battle ensued at Poshkur, in which Futteh Shah was totally defeated, and fled to Hindustan; the two sons of his chief adherent Ibrahim Magrey were taken prisoners and his party broken.

A. D. 1512.—Mahomed Shah then mounted his throne for the third time, but was not permitted to reign in peace beyond nine months, inasmuch as Futteh Shah, who had been sufficiently dispirited by his defeat to remain quiet thus long, at length, regaining confidence, despatched his son Hubbeeb Khan (whose mother was of the Chukk tribe), to Cashmere, where he succeeded in forming a close alliance with the Chukks and other discontented parties, and as a preliminary, it was arranged that in the event of success, one-third of the country should be set apart for Kajee Chukk, one-third for Jehangire Padr, and the remainder for Sirung Reigna; Futteh Shah himself receiving a general tax from the whole. Upon this the pretender in person came to Cashmere and a battle ensued in the Bongil Pergunnah, in which Ibrahim Magrey (now a staunch supporter of the king Mahomed Shah) was killed, with his two sons; and the king's army totally defeated. Upon this Mahomed Shah, A. D. 1515, abandoned the country, fled to Hindustan, and solicited aid from Sikunder Khan Lodi, who granted him an auxiliary force of 30,000 horses, A. D. 1515, with which he marched towards Cashmere. Meantime Futteh Shah had assumed the government, but no sooner did the nobles of his party (Kajee Chukk, Jehangire Padr, Nusrut Reigna), &c. hear of the approach of Mahomed Shah, with such an overpowering force, than each sought to make his own terms and tendered his submission to the king, whereupon Futteh Shah fled for the fourth and last time, and Mahomed Shah preceding the bulk of his army, arrived in Cashmere with 2,000 light horse and mounted his throne for the fourth time, making Kajee Chukk his minister and throwing Sirung Reigna into prison. The latter, however, he soon after liberated, for we find in the year A. D. 1519, that chief together

with his former master Futteh Shah, died in exile amidst the mountains of Hind.

A. D. 1519.—It might have been now expected that, his rival being dead, Mahomed Shah would at length have been left in the peaceable enjoyment of his throne, but although indeed he continued to bear the title of king, he was a mere puppet in the hands of his ministers; and his country from his last accession to the throne till his death in the year A. D. 1537, was the scene of incessant intestine struggles for power amongst those powerful nobles in whom rested the real power of the state. From this period until the subjugation of the country by the Emperors of Delhi, the history of Cashmere is little else than a record of the wars of the tribes of Chukk, Reigna, and Magrey, in which, the former two were chiefly at variance, the Chukks generally having the upper hand, and eventually a decided preponderance of power. To follow the details of these petty wars seems needless, and indeed the various historians of the period differ considerably from each other in their narration of events: The frequent mention also of various chiefs bearing similar names, renders it still more difficult to trace any consecutive history; the following facts, however, may be shortly enumerated as occurring from about the time of Mahomed Shah's last accession to the throne in the year A. D. 1519.

Nusrut Reigna and Sohur Magrey were both killed in battle.

Kajee Chukk, the king's minister, quarrelled with his old ally Jehangire Padr, and forced him to fly the country: (in the year A. D. 1520.)

Mullick Abdie Reigna, and Sohur Magrey, brought prince Sikundar Khan, a son of Futteh Shah, with a large army from Hindustan; Jehangire Padr and others joined them, and amongst them they set up Sikunder Khan for the throne, Kajee Chukk despatched his son Musood Chukk against them, (A. D. 1520,) who met them in the Lar Pergunnah, but was defeated and slain; Prince Sikundar however finding the Chukks, as yet, too strong for him, retreated into the mountains. After this Kajee Chukk became so powerful that the king Mahomed Shah, becoming jealous of him, formed a party of Magreys in opposition, who, taking

him at unawares, forced him to fly to Naoshera, with his adherents: he was there met by another enemy, namely, an army of Turks who were advancing under the command of Shaik Allie with a view of invading Cashmere; these however he worsted and succeeded in effecting his escape from the country. He remained in exile some eight months, after which he contrived to make up matters with the king, who had begun to find his new supporters more troublesome than the Chukks. He accordingly returned, and, countenanced by the king, dispersed the Reignas and Magreys; the chief of the former he seized and the latter fled. (A. D. 1528.) Kajee Chukk now openly dethroned the king, who was driven into exile, and set up his own son Sultan Ibrahim. Encouraged by the want of unanimity amongst the nobles of Cashmere, the surrounding nations seem, at this period, to have been continually on the watch for opportunities of effecting its conquest, and several armies of these nations at different times, actually entered the country and took part in its intestine struggles.

The Magreys allied themselves to Allie Beg, who brought 20,000 horse, and their combined forces met Kajee Chukk in the Bongil Pergunnah; that chief behaved with his accustomed bravery, (A. D. 1528,) but many of his family having fallen or been taken prisoners, he at length reluctantly left the field. The Magreys then got the upper hand and Allie Beg returned to the Punjaub. Encouraged by the internal weakness of the country, the surrounding tributary states now also began openly to revolt, and in the year (H. 937,) 1530 A. D. Mirza Kamran Chogatai instigated by his brother, (A. D. 1530,) the Emperor Humaioon, who that year ascended the throne of Delhi, and who until his attention was distracted by his own troubles, seems to have had his eyes on Cashmere (the ancient national chronicle of which country the "Raj Taringini" was first translated by his orders) advanced with an army of 30,000 horse as far as Naosherah. The danger being imminent, the nobles in power turned their eyes on their former enemy, the brave and wise Kajee Chukk, (A. D. 1530—7,) whom they solicited to return and fight for the common cause. He accordingly joined them, and the allied forces of Cashmere, signally defeated the army of Mirza Kamran in a pitched battle near the

city of Srinugger. Soon after this, Syud Khan with an army of Kashgurries, and Mirza Hyder with 14,000 horse invaded Cashmere by the Lar Pergunnah ; the Cashmeries being unable to give battle, took to the hills, but during the winter made some head against the invaders ; and although in one affair alone they lost 1,600 men, they succeeded in bringing them to terms. It was stipulated that Sikunder Khan Kashgurrie should marry a daughter of the exiled king Mahomed Shah who was himself married to a sister of Kajee Chukk, who was thus uncle to that Princess : upon this the Kashgurries left the country.

The king Mahomed Shah died in exile in the year H. 944, and was nominally succeeded, successively, by his eldest son Shums-ood-deen Shah, who reigned for one year, (A. D. 1537,) and by his second son Ismaul Shah who married a daughter of Kajee Chukk, the actual ruler of the country. At length Kajee Chukk, feeling jealous of the Magreys, made war on them, but being worsted, was forced to take to the mountains : the return of Reygie Chukk however from Jummoo soon enabled him again to take the field : a general rally of the Chukks ensued, which led to the defeat and dispersion of the Magreys, whose power being thus effectually broken, Kajee Chukk ruled in peace for three years, and, as far as the distracted state of the country admitted, turned his attention to its improvement and to the administration of justice. It was not, however, fated that he should longer retain the throne he had so hardly won.

A. D. 1540.—In the year of Hejira 947, his kinsman Reygie Chukk and Abdal Magrey, entering into an alliance, called in the aid of Mirza Hyder, a foster brother and faithful adherent of the Emperor Humaioon (A. D. 1540). That chief, under the stipulation he should enjoy the real powers of sovereign, consented to set up Tarkh Shah, a boy, son of the usurper Futteh Shah, (see page 416 et seq.) as king of Cashmere ; and advanced with a considerable army. Kajee Chukk being alarmed, entered into an alliance with Shere Khan\* Afghan, then in rebellion against Humaioon, and gave him his niece (a daughter of Mahomed Shah) in marriage.

(\* Afterwards Shere Shah.)

A battle ensued, in which, however, Kajee Chukk was defeated, and fled across the Pir Pinjal as far as Thannah, where he died. He is related to have been of a kind and merciful disposition, and, except in battle, never to have shed the blood of his enemies. I may here remark that mercy towards the vanquished appears to have been (with a few exceptions) a characteristic of the gallant tribes which so long withstood the invasions of surrounding enemies, and at length, only succumbed to the weakness arising from intestine dissensions, and the fatal error of calling in foreign aid.

A. D. 1540.—Mirza Hyder, being now established, made Abdah Reigna his commander-in-chief, but coined in the name of Tarkh Shah. He was in power ten years; he set to work to clear the country of the powerful nobles, many of whom he put to death or banished. Reygie Chukk paid the penalty of his rashness in calling in a foreign ally, being forced to fly the country. Soon after the accession to power of Mirza Hyder, his patron, the Emperor Humaioon being forced to fly to Persia, (A. D. 1542,) the usurper Shere Shah ascended the throne of Delhi; the same year also, during the misfortunes of his father, was born in exile the future Emperor Akbar, destined at no very distant period to exercise dominion over the fair province of Cashmere, (A. D. 1540—51,) the brightest jewel of his crown. Left to his own resources, Mirza Hyder turned his attention to alliances with the surrounding states, always hostile to the influence of Cashmere, and ready to side with any invader against that country; he introduced armies of those nations, especially Kashgurries, with a view of securing a counterbalance to the power of the native nobles, who, for a time, being helpless, acquiesced in this state of things.

A. D. 1551.—At length a party of the Cashmere nobles, (Hussan Magrey, Quaja Heigie, Abdie Reigna, and others) entered into a conspiracy, having for its object the defeat and dispersion of the foreign armies in detail. With this view in the character of confidential advisers, they persuaded Mirza Hyder to detach his forces to the frontiers, and selected Dowlut Chukk to accompany the principal army consisting of Kashgurries. No sooner was this effected than Dowlut Chukk, instructed in the part he was to play, seized the person of the commander of the Kash-



gurrie army (a nephew of Mirza Hyder) and communicated this success to the other conspirators, who immediately threw off their disguise and fell upon the army of that chief, (now without a leader), and the other detached forces, all of which they defeated; and then, combining their own army, boldly advanced to give battle to Mirza Hyder himself.

A. D. 1551.—He, however, having placed his family and treasure in the Fort of Indrakoul, resolved upon making a night attack upon the rebellious nobles; with this view he, one day, went out alone to reconnoitre the enemy's position and, ascending a tree for that purpose, was there discovered and slain by one of the hostile spearmen (a butcher) who on challenging him, detected his foreign accent.

Thus perished (H. 959) the intrusive governor, who however had done much for the country during his term of power, having introduced many artisans and manufacturers. The conquerors spared all his family, who retired to Hindustan.

Abdie Reigna now came into power for a short time, but the Chukks under the leadership of the three sons of Kajee Chukk, (Gazie Khan, Hussein Khan, and Allie Khan,) rallied their forces, and drove away Abdie Reigna, (A. D. 1552,) who fled towards Hindustan, but his foot being caught by the branch of a vine on the road, he was dragged off his horse and killed by the fall, having enjoyed the supreme authority one year. The Chukks, having now the upper hand, made Hubbeeb Khan (son of the famous Shums-ood-deen Chukk) ruler of Cashmere, with Dowlut Chukk for his commander-in-chief. At this time a great earthquake occurred, which lasted seven days and destroyed many of the principal buildings, and considerably altered the channel of the river Jhelum; in fact it was during this earthquake, that the course of the river Jhelum, being turned, produced that change in the relative positions of the two cities of Hussanpoora and Hussainpoora, which the superstition of the Mahomedans has magnified into a miracle well known in Cashmere legends.

Dowlut Chukk, the commander-in-chief, at this time married the widow of his uncle Kajee Chukk: enraged at this proceeding her eldest son Gazie Khan, having caught him off his guard, seized

him and put his eyes out. Many stories are related of the prowess and gigantic strength of this brave chief, amongst others of his shooting an arrow two koss; to this day it is said the pillars raised to commemorate the deed are to be seen; he is also said, whilst at the court of Delhi, to have arrested the progress of an elephant by seizing the animal's tail! There is doubtless exaggeration here, but the Chukk tribe generally seem to have been endowed with a physique beyond the ordinary run of men, and, as before stated, (page 420). Cashmere superstition attributed their extraordinary strength and stature to a supposed descent from a "serpent god."

As before related, Hubbeeb Khan (A. D. 1552,) was at this time king of Cashmere, but appears to have been a man of little capacity.

Gazie Khan gradually acquired popularity, till at length the king, having one day disgusted all present by some act of folly in open Court, his crown was snatched from his head by Allie Khan, brother of Gazie Khan, to whom Allie presented it; and, that chief being hailed as king with acclamation, Hubbeeb Khan was forced to resign power. During this reign, notwithstanding the king's feeble character, many of the tributary provinces which had been wrested from the crown of Cashmere, were recovered by his armies. Meantime the blinded Dowlut Chukk, together with the chiefs of the tribe of Reigna, had proceeded to Delhi, A. D. 1555, to crave the assistance of the Emperor Humaioon who had lately regained his throne and was then at that city. He, however, happened to be killed the very day of their arrival by a fall from his palace wall. Thus disappointed, the Reigna entered into an alliance with a certain Ameer of Kashgur, who was at this time at the court of Delhi, and with his aid raised an army for the invasion of Cashmere; with that purpose, advancing as far as Kuspa, there encountered the enemy. A great battle ensued, which lasted two days; the first day's fighting, although indecisive, was so far favourable to the Chukks, that the Reigna considered it proper to send his ally off the field, but he himself renewed the battle the following day; he was however taken prisoner, and put to death by the victorious Gazie Khan: 4,000 men were killed on both sides in this battle.

Two years after this battle the king put down (A. D. 1557,)

another revolt, having for its object the restoration to the throne of Hubbeeb Khan, in which the latter was killed by an elephant.

After this, his possession of the throne was again disturbed by a nephew of Mirza Hyder, who invaded Cashmere with an army of 12,000 Moguls from Kashgur. The Cashmere army headed by the king in person advanced to Lohar Kote to meet them: upon the eve of battle Gazie Khan promised an ashrafee (about 16 Rs.) for every head of an enemy: A battle ensued in which the king was completely victorious, and 7,000 heads of the enemy were presented to him after the engagement: he is said to have exceeded his promise and to have disbursed two ashrafees per head.

A. D. 1557.—This prince seems to have been a just, but a very stern ruler, and it is related of him that he put to death his own son for having, in a fit of passion, killed his uncle, who had carried him an order from the king his father to appear at Court, which the fiery youth resented; he is said however to have exhibited remorse so far that he ever afterwards turned away his head when he happened to pass near the spot of execution. This able and energetic prince was also a poet and portioned out his time like our own Alfred. After reigning 9 years and 9 months, feeling the approach of old age, he abdicated the throne in favour of his second brother Hussain Khan, (H. 970,) A. D. 1562, who reigned in peace for five years; after which period however his (bastard) brother Sushkur Khan rebelled, and a battle took place at Kuspa (thus a second time the scene of a fierce engagement) in which the rebel chief was wounded and his army dispersed. Shortly after this event the king's little son Ibrahim Khan died of the small-pox, and the king himself was so struck with grief that he pined away and, five months afterwards, died. Hussain Shah (A. D. 1570) was succeeded by the third brother Allie Shah. At this time the descendants of Zein-ul-ab-ood-deen made some head and advanced as far as Neosherah, upon which Allie Shah despatched his nephew Lohur Khan with 5,000 horse against them, who defeated them by a stratagem. The king also put down a rebellion in Kishtewar. During this king's reign, there was a great famine which lasted for three years, arising from excessive falls of snow; during the two first years of this calamity the king expended

his entire revenue and private property on the relief of the people, which resources at length failing, he ordered his nobles to contribute their share to the public necessity. On enquiring of a noted fuqeer into the reason of the continued snow, he was told in reply that it would only cease on his death, which in fact took place from a fall from his horse within the year. He reigned ten years and was succeeded by his son Yoosuf Khan. (H. 983,) A. D. 1580.

Soon after the accession of this king a rebellion was headed by his uncle, who however was slain in battle and the revolt suppressed. The king's proud and overbearing character soon alienated the hearts of his nobles, who formed a conspiracy against him : some fighting occurred near the city on the plain near the Eedgurh, in which 300 in all, fell on both sides ; the same night, however, the king sent his crown to his minister and commander-in-chief Syud Mobarruck and retired to the hills of Hind.

Syud Mobarruk after ruling two months, finding himself opposed by the nobles, in his turn resigned the crown in favour of Lohur Khan, (A. D. 1580,) who proved a very just and good ruler.

In his time, adds our chronicle, there was such a plenteous season that rice sold for two maunds a "pice !" Yoosuf Shah now applied to the Emperor Akbar for assistance to enable him to recover his kingdom, but, the Emperor hesitating to forward his views, he went to Lahore and there raised a small force, at the head of which he marched towards Cashmere, in hopes of being joined by others who still adhered to his interests in that kingdom ; nor was he mistaken. On his arrival at Neosherah many nobles joined him with their followers, and thus re-inforced he gave battle at that place, which action, although indecisive, gained him some advantage ; he then advanced to Rajawer, the Rajah of which place joined him with his forces, and several more Cashmere chiefs came over to him with their adherents : meantime Lohur Khan, with the bulk of his army was at Hurpore, (A. D. 1581,) awaiting the enemy's approach, and now endeavoured to out-manœuvre him by a rapid march to Baramoola (? Barungulla). Yoosuf Shah, however, marched to his flank, crossed the Pir Pinjal by an intermediate pass

(of Firozepore) and got to Lohur betwixt him and the Capital, where he received additional reinforcements from the Kamraj. Lohur Khan however immediately made a forced march with 12,000 horse and 25,000 foot and endeavoured to turn his position.

After some manœuvring Yoosuf Khan left the armies in position against each other, and proceeded to the capital by water, defeating a party of the enemy who endeavoured to oppose his entry. He immediately took possession of the throne, distributing presents and shewing himself publicly to the people, (A. D. 1582.) On hearing of this proceeding Lohur Khan followed his rival to the city, where finding himself unsupported by popular feeling he concealed himself in the house of Kasi Moosa, but was soon discovered and brought before Yoosuf Shah who put his eyes out.

Yoosuf Shah, being thus again established on the throne, abandoned himself to voluptuous enjoyments. Displeased with his course of life, and seeking doubtless, for a pretext for invading the beautiful province of Cashmere, the Emperor Akbar summoned him to appear at the imperial court. He was at first inclined to resist this assumption of authority, but complied so far with the Emperor's orders, as to send his younger son Mirza Hyder in his stead, but upon Akbar's threatening "to tread Cashmere under foot of horses," (literally), he despatched his eldest son Yakoob Khan (A. D. 1582,) with magnificent presents to deprecate his wrath. About two years after this, it happened that the Emperor Akbar was engaged in a war with Rajah Neelkunt, against whom he was about to despatch an army, when Yakoob Khan, who, up to this time had remained at court, requested to be allowed to undertake alone the adventure of capturing this person, which he in fact achieved by seizing the Rajah whilst bathing in the midst of his camp, and dashing away with him, with a few followers mounted on fleet horses. He was however but ill rewarded for this service, being confined by the Emperor on the plea of his being insane, and, indeed, he seems to have been of a wild unsettled character and likely to cause trouble. He however soon after effected his escape and returned to Cashmere with the Emperor's consent. Akbar now summoned the king Yoosuf Shah (A. D. 1584) to present himself in person at his court, then at Lahore. The nobles, however,

refused to allow him to leave the country, although he himself, alarmed at the near proximity of the Emperor, expressed his readiness to comply, and even went so far as to imprison his son Yakoob Khan. Seeing this state of things, the Emperor despatched an army of 50,000 men under Bugwan Dass to enforce compliance. That leader experienced a check near Attok, but Yoosuf Shah, fearing the ultimate consequences, secretly withdrew from his own army and delivered himself up to Akbar's general, who sent him under an escort to Lahore, where Akbar delivered him over to the custody of his police minister Todar Mull, who kept him under surveillance at that city for upwards of two years, (A. D. 1585,) after which he was sent in command of 500 horse in company with Rajah Maun Sing to Bengal, where he died of grief and despair (1587). On the flight of Yoosuf Shah his army called upon his son Yakoob Khan to lead them. A second battle ensued, in which the Emperor's army was defeated with the loss of 3,000 men, and was afterwards reduced to such stress amongst the mountains of Hoozara, from cold and want of food, that they are said only to have sustained life by slaughtering their elephants and sleeping within their still warm bodies. The imperial army being thus repulsed, Yakoob Shah (A. D. 1585,) ascended the throne of Cashmere over which he reigned one and half years. Although of a bravery approaching to recklessness (a quality which usually commands the respect of men) this prince was possessed but of little judgment and unfit to rule. He was also of the Shiah sect of Mahomedans, the Soonee sect being the predominant one in Cashmere, which circumstances combined to render him obnoxious to his nobles, a party of whom headed by Shums-ood-deen Chukk, Alumgire, Magrey, Allie Dar, and Hussan Mullick broke into open revolt and a struggle, which lasted seven (7) days, ensued in the capital city of Srinugger, but neither party being victorious, a conference took place and the Kamraj was guaranteed to the nobles. The truce was however soon broken through, owing to the insolence of the Shiah priests, and hostilities recommenced, which ended in the rebel nobles being forced to retreat to the mountains of the Kohihama. The Shiah priests, who seem to have possessed great influence over the king's mind, now instigated Yakoob Shah to still



greater outrages (A. D. 1585,) against the rival sect of Soonees, whom he compelled to call aloud the Shiah confession of faith ( *على ولي الله* ) to their great scandal. The Kazi of the city refusing to do this, they put him to death by tying him to the tail of an elephant, and in that manner dragging him through the city. The Soonee historians relate, that on this occasion, such a noise thundered from the surrounding mountains, that several ladies of the king's zenana, who were near their time, became mothers on a sudden.

This act of cruelty and oppression determined the Emperor Akbar to subjugate the country, and accordingly he despatched an army of 30,000 horse under his admiral Kasim Khan and the fugitive Hyder Chukk, who entered Cashmere by the Hurepore pass. Nothing daunted, Yakoob Shah, though with an inferior army, marched to engage the enemy, and drew out his forces in order of battle, but being at this crisis deserted by his nobles, (A. D. 1586,) he was forced to fly across the mountains to Kishtewar with an escort of 60 horse. Kasim Khan now obtained possession of the capital, (A. D. 1586,) but soon after jealous of the respect paid to his colleague Hyder Chukk by the native Cashmeries, imprisoned him. Yakoob Shah however was by no means of a disposition to surrender his country without a struggle; he rallied round his standard a few gallant spirits, advanced from Kishtewar, and after several desperate actions with detachments of the Emperor's army, in which he was generally successful, he made a rapid march and suddenly appeared on the hill of the Takt-i-Soliman overlooking the city of Srinugger, where he pitched his camp.

Kasim Khan now attacked him with his whole army, and a desperate conflict took place in which Yakoob Shah (A. D. 1586,) although worsted with the loss of his commander-in-chief Shumsood-deen Chukk and many other of his principal adherents, still retained his position.

The Chukks now determined to make one desperate effort for the independence of their country, and rallied round the brave Yakoob Shah who still sternly held his ground on the Takt-i-Soliman. This gallant tribe, now a mere handful of men, fell with inconceivable fury upon the Emperor's army, and fairly drove it into the city,

where the soldiers took refuge in the palace, fort and other strongholds, where they remained in a state of siege.

The Emperor, finding his army insufficient to reduce the country, reinforced it with 20,000 horse under Mirza Yoosuf Khan. Upon the approach of this force, Yakoob Shah (A. D. 1587,) despatched Lohur Chukk to defend the passes, who however, being far outnumbered, was unable to offer any serious opposition to the enemy's advance.

In consequence, Yakoob Shah was a second time forced to retreat to Kishtewar, and Yoosuf Khan superseding the admiral, became governor of Cashmere and rewarded his allies with grants of money and land. (A. D. 1587).

The Emperor Akbar now announced his intention of visiting his newly acquired province, and accordingly the following spring proceeded by the Pir Pinjal. The governor Yoosuf Khan went forward as far as Barungulla to make his salutations, and conducted his sovereign with due state to Cashmere, which may be considered from this date to have passed from the hands of its ancient rulers under the sway of the Guznivide throne.

The native historians indeed date the ascendancy of the power of Delhi from the (A. D. 1588) arrival of Kasim Khan (Hej. 995) 1586 A. D. who always appears first in their lists of Soobahdars. The country cannot, however, be said to have been totally reduced to the condition of a province until the year 1592, inasmuch as large bands of the Chukks hovered in the mountains taking advantage of every opportunity of disturbing the intrusive governors, who from this time were periodically appointed from Delhi, nor indeed was it till the time of Etekaad Khan (1622) who hunted down the Chukks and put them to death as robbers and outlaws, that this fierce tribe was totally subdued.

After viewing the country, Akbar returned towards Cabul by Puklee, where Yakoob Shah, upon his safety being guaranteed, presented himself before the Emperor.

A. D. 1588.—No sooner however, had Akbar departed, than the governor, being opposed by the native nobles, was reduced to such stress that he applied to Delhi for re-inforcements, but their arrival being delayed by the snows of winter, which at that season render the

passes impracticable, Mirza Yardgar, a noble, proclaimed himself king and besieged the governor in the city of Srinugger. The Emperor however, on the opening of the season, sent a picked army against him under the command of Shaick-Furreed-Bukshee. On its approach towards the relief of the city of Srinugger, whilst hesitating to engage so superior a force, Mirza Yardgar was treacherously murdered by Sharock-Beg and Ibrahim-Kakur, who presented his head to the Emperor's general.

A. D. 1592.—The Emperor himself now followed in person and was received with every demonstration of joy by the Cashmeries. Being spring, he remained in the valley during the entire summer, but on the approach of winter returned to his capital, leaving Mahomed-Koolie-Khan as Soobadar, with Todar Mull to assist him in reducing the country to order.

As we now find Cashmere (although disturbed by the incursions of the Chukk tribe, who still wandered unsubdued in the hills) reduced to the condition of a province of the Guznavide throne, it seems a proper point to close this portion of its history.

#### PART 3RD.—*Cashmere under the Emperors of Delhi.*

A. D. 1586.—The native historians of this period, with the exception of Abul Fazl, agree in their arrangement of considering Cashmere to have passed out of the hands of its ancient rulers, and to have become an integral portion of the empire of Delhi from the year A. D. 1586, (H. 995,) in which date, we have seen Kasim Khan obtained possession of the city of Srinugger. Abul Fazl however closes the first portion of his history with the flight of Kajee Chukk to Hindustan (H. 947,) in the 1540, and the establishment of Mirza Hyder on the throne of Cashmere, which thus, according to him, passed under the sway of Humaioun Emperor of Delhi, but as that chief was soon dispossessed of his throne and slain, and as after him several native princes reigned for short periods, it does not seem advisable to follow his arrangement on this point, which was no doubt adopted with a view of flattering his Emperor and patron Akbar.

The second portion of his history moreover commences with the visit of Akbar to Cashmere. (1587.)

We have seen also that in the year 1587 A. D., the admiral Kasim Khan was relieved by Yoosuf Khan the 2nd Soobadar, who, after being in power five years, was in his turn succeeded by Mahomed Koolie Khan on the departure of Akbar in the year 1592 A. D., with which event also we closed our last chapter. (A. D. 1592.)

There is some discrepancy of dates amongst the several authorities about this period, some historians giving six years, and others eleven years, as the term of Koolie Khan's government. Abul Fazal also records a third visit of the Emperor Akbar to the valley, and he is probably correct; but in general the accounts of the various Emperors' visits to Cashmere are singularly curt and void of interest; indeed it seems to have been reserved for an European (Bernier) who long afterwards visited the valley in the train of the Emperor Aurungzebe, to give any thing approaching a graphic account of the pageantry we may suppose to have accompanied their progresses. Of the several governors also little more is recorded than their names, dates of appointment, and terms of government. The following few facts, however, derived from various sources, appear to have taken place and may be briefly recorded.

A. D. 1592.—As before mentioned (page 432.) Todar Mull, the celebrated police minister of Akbar, was entrusted under the Soobadar Mahomed Koolie Khan, with the task of bringing the country into a proper state of subjection.

It was therefore, probably at his recommendation that the fort of the Harrieparbut or (to use the Mahomedan name) the Koh-i-Maran was constructed, with a view of overawing the capital. It was finished about the year 1597, A. D. at a cost of £1,100,000. Means were at the same time adopted of rendering the native Cashmerians less warlike, and of breaking their old independent spirit. Amongst other measures to effect this, I have been informed (but have nowhere seen it recorded) as a fact very generally believed in Cashmere, that the Emperor Akbar caused a change to be introduced in the dress of the people.

In place of the ancient well-girdled tunic adapted to activity and exercise, the Emperor substituted the effeminate long gown of the present day, a change which led to the introduction of the enervating *kangni* corresponding with the French *Chauve-chemise* or

pot of charcoal fire; without which a modern Cashmeree is seldom seen, A. D. 1597. And it is possible, that this measure, one out of a long series of acts of systematic tyranny and spirit-breaking oppression, may have had its effect in changing the character of this once brave and warlike race; for at the present day although remarkable for physical strength, the natives of Cashmere are totally wanting in all those qualities for which they were formerly distinguished. Whilst, however, thus carrying out the severe policy suggested by his minister as regards the inhabitants, it must not be supposed that the beneficent Akbar neglected the improvement of his fairest province; on the contrary, in addition to his acts for the amelioration of the condition of the ryots, he appears to have done much towards the embellishment of the country, which he adorned with palaces and gardens, and beautified by the introduction and cultivation of various trees and shrubs.

A. D. 1600.—He erected at an expense of £340,000 (thirty-four lakhs of rupees) the noble palace of Nagur Nagur below the Harrieparbut, of which however, scarcely a trace exists; and the celebrated Poplar Walk (which remains to this day a memorial of his taste) attests his magnificence.

He introduced an improved breed of large horses, as before his time the country only contained ghoonts and yaboos.

Our chronicle records cherries as owing their introduction into the valley to Akbar; this fruit, being in small quantities, has always been considered royal property in Cashmere, and was afterwards named (شاہ اپلو) “king apples” by Jehangire.

He commenced many other works of public utility, which his successors completed.

The East India Company was founded in 1600.—It was perhaps about the beginning of the 17th century that the Emperor visited his province of Cashmere for the third and last time, about which period also, a power was organized in a far distant land, destined, before two centuries had set, to exercise dominion over the magnificent Empire which then called him master; of all his provinces the fair valley of Cashmere being now nearly alone in its independence of that beneficent rule. Under Akbar Kabool and the intervening countries (Puklie, Bhimber, Sewad, Bijore, Kanda-

har, Zabulistan) were incorporated with the Soobah of Cashmere, and its annual revenue may be estimated a little short of one million sterling. (See Appendix). The standing army of the whole was 94,800 horse, and there were 37 garrisoned forts in various parts of the country, containing 2,400 foot or artillery. In the year 1604, A. D. Nawab Koolinj Khan was despatched from Delhi as Soobahdar of the country, but owing to the death of the Emperor Akbar, which took place in the succeeding year, (1014 H.) he only remained one year, during which a severe famine occurred. Akbar, dying at the age of 64 after a reign of fifty-two years, was succeeded by his son Selim, (A. D. 1605,) who assumed the name of Jehangire and the following year appointed Mirza Allie Akbar viceroy; (A. D. 1606,) but it seems doubtful whether this Soobahdar ever exercised power in his proper person; in fact according to the historian Hyder Mullick (who, however, it must be confessed is not generally to be trusted where the history touches his own times) the viceroyalty of Cashmere was at this time exercised by Hyder Mullick (himself) and Allie Mullick (his brother) nobles of Cashmere, and he omits the two last named Soobahdars from his list altogether; the former indeed is omitted in several lists I have met with. The same author relates that in the year H. 1015, (1606 A. D.) Kootub-ood-deen Khan and other Mogul Koti chiefs made an attempt to dispossess Yoosuf Khan, (?) but were defeated; perhaps the system of Naibs had already commenced. Mirza Allie Akbar, after a power of four years (whether exercised personally or not) was succeeded successively by Hashim Khan (A. D. 1610,) for three years by Nawab Safdar Khan (A. D. 1613,) for two years, and by Ahmed Beg Khan (A. D. 1615,) for three years, during whose tenures of office no event of importance occurred. At length Dilawer Khan (A. D. 1617,) became governor of Cashmere, and shortly afterwards reduced Kishtewar to its allegiance; the Mullicks of Shahabad being his allies and advisers (Hyder Mullick). During the time of this Soobahdar, the country was visited by a pestilence, and shortly afterwards the great mosque or Jumma Musjid, built by Sikunder Butshikan, together with 12,000 houses in the city were consumed by fire. The father of the historian Hyder Mullick (who was of the Shiah sect) was accused of having

been concerned in the conflagration, and, at the instigation of Noor Jehan Begum, he was compelled to rebuild it at his own expense. It had been twice partially destroyed by fire before, and rebuilt, once by Hussan Shah, and again by Ibrahim Magrey.

A. D. 1619.—The Emperor Jehangire, urged thereto by Hyder Mullick (if we may believe the historian's own assertion), now determined upon visiting Cashmere, and was conducted by the Pynwutch (now Poonch) road under guidance of Mullick Hyder Rais-ul-moolk-chogatai (to give him his full titles). This noble afterwards became a protégé and confidant of Noor Jehan Begum, and conducted many works of improvement and utility. Cashmere having been surveyed and reduced to order in the time of the Emperor Akbar, having also been beautified with palaces and gardens, little else remained for his son and successor, the magnificent Jehangire, than to enjoy the delights of this eastern paradise, in company with his empress, the peerless Noor Mahal whose romantic spirit appears to have led her lord and emperor to roam into the most secluded and picturesque recesses of the valley, many of which pleasant retreats, are to this day pointed out as the spots where the royal pair were wont to disport themselves in those days of regal abandon.

A. D. 1621.—Again in the summer of 1621 the emperor honored the valley with a visit for the second time. A successor had the previous year been appointed to Dilawer Khan, in the person of Iradut Khan, who is said to have built a beautiful palace for the emperor at Naopoor, and afterwards chopped off the Master Mason's hand to prevent his again executing a similar work of art: he however conferred on him great wealth as a compensation for his loss. After being in power two years, he was succeeded in 1622 by Nawab Etekaad Khan, a cruel governor, who commenced a systematic destruction of the Chukks, whom he hunted down and put to death. Bands of this fierce tribe still infested the surrounding hills, especially the range to the north of Cashmere, from which strongholds they issued on their predatory excursions. This crusade had the effect of almost exterminating that ill-fated tribe, the descendants of which at the present day, are the professional horse-keepers of the valley, and in their character, still in some degree display remnants of that ancient independent spirit, which led to their destruction.

A. D. 1624.—The highways being somewhat cleared of these turbulent spirits, Jehangire again paid a visit to Cashmere in the summer of 1624 A. D. and built many palaces and summer-houses, more especially he completed the construction of the celebrated Shalimar gardens immortalized by poets and travellers. The Naseem (or salubrious) and Nishat Baghs was the fancy of Noor Jehan Begum, to whose taste also many other beautiful retreats owed their origin. The ruins of palaces at Manasbul, Echibul, Virnag, &c. attest her taste in selecting picturesque sites.

Three years after this the emperor visited Cashmere for the 4th and last time, (A. D. 1627,) (or according to Mohammad Azim for the 7th) but on his return towards Hindustan, died at Rajawer, whence his body was conveyed to Lahore and there buried. His widow Noor Jehan Begum, took up her residence at Lahore after Jehangire's death, where she employed her leisure for the remaining twenty years of her life in constructing a magnificent tomb for her late lord and emperor. زینت شرع ۱۰۳۷

Shah Jehan succeeded to the empire of Delhi in the year A. D. 1627, but Etekaad Khan still remained viceroy of Cashmere, notwithstanding that the people of that country, groaning under his tyranny and exactions, despatched an embassy to complain of his oppression to the new emperor.

At length in 1633 A. D. Zufr Khan was appointed to succeed him, and the following year the emperor paid a visit to the valley in person, where he amused himself with sporting and planting gardens; amongst others he built the beautiful summer-house in the Shalimar gardens. The emperor again visited the country whilst Zufr Khan was governor, who also improved the country much, and introduced fruit trees and flowers, from Kabool. He did not confine his supervision moreover to embellishment, but invaded Thibet, and took the fort (Ladak) thereof which he annexed to the Soobahdarie of Cashmere. In his time religious disturbances betwixt the rival sects of Shiahs and Soonees took place.

In the year A. D. 1640, Prince Morad Buksh of Delhi visited Cashmere, and married a daughter of the Mullicks of Shahabad: he ruled the country for one year, and upon his departure (A. D. 1642,) Allie Murdan Khan was sent as Soobahdar, but was



relieved the following year by the emperor's favourite Zufr Khan (second time) who remained in power four years, during which period Shah Jehan (A. D. 1645,) visited Cashmere: he was succeeded by Tarbiat Khan in whose time a famine occurred, (A. D. 1647;) after two years Hussein Beg Khan (Usbuk) (A. D. 1649,) succeeded, whose tenure of power was also two years. Allie Murdan Khan now became Governor of Cashmere for the second time. A. D. 1651.

This nobleman was governor of Lahore as well as Cashmere, and was in the habit of spending the winter season at the former city, and proceeding to Cashmere on the approach of spring each year. For his convenience in these journeys (A. D. 1651,) he built many Seräis along the roads leading into Cashmere, some of which remain to this day; his travelling expenses are said to have amounted to a lakh of Rupees (£10,000) each trip. In this governor's time there were "bread-riots" in which many lost their lives.

The emperor visited Cashmere in the summer of 1061 H., and was accompanied by many poets and savants: amongst the former, a certain Hadjie Mahomed Jan, a Persian, composed a poem on the country, but appears to have been more impressed with the difficulties of the road than the beauty of the landscape. He compares the sharpness of the passes to the "swords of the Feringees," and their tortuous ascents to the "curls of a blackamoor's hair!"

رہی بےچید تراز موئی رنگی به تندی چون دم نیغ فرنگی

Of all the emperors of Delhi, Shah Jehan appears most to have affected the strains of poets and musicians, and, as they and the courtiers increased in the land, the Rishees and devotees, for which Cashmere had been so celebrated, receded like game before the hunter, into the most dreary solitudes, and were in danger of becoming extinct amidst the discouragements of this festive court, until they again recovered under the subsequent reign of the orthodox Aurungzebe. A. D. 1657, (H. 1048,) Luskur Khan succeeded Allie Murdan, and during his short tenure of power, so severe a winter occurred, that the river and all the lakes were frozen over, hard enough to admit of passage on their surface. This year also the emperor Shah Jehan was deposed by his son

Alumgire or (vulgo) Aurungzib and confined for life in the fort of Agra, where he died (H. 1076). رضى الله عنه ١٠٧٦

A. D. 1658.—Aurungzib being confirmed on the throne appointed Etimaad Khan Soobahdar in the year 1660 A. D. of whom I can find no other record. In the year 1662 A. D. (or according to others 1664 A. D.) Ibrahim Khan son of Allie Murdan Khan was sent to Cashmere as Soobahdar.

This year also the emperor commenced his progress to Cashmere, and here we fortunately possess the graphic pages of Bernier, who accompanied Aurungzebe as state physician; these give us a lively picture of the state and magnificence of an imperial progress; according to him the emperor's cortège set out from Delhi on the 6th December, (A. D. 1663,) at 3 P. M. that hour having been pronounced an auspicious one by the court astrologers.

It consisted of 35,000 horse and 10,000 foot, 70 pieces of heavy cannon, and 50 or 60 light field-pieces, or (as it was called) "stirrup artillery." Roshenara Begum accompanied the emperor, and our physician enlarges upon the spectacle of her stately train of elephants on the line of march.

A. D. 1664.—The army arrived at Lahore, 25th February, and crossed the Pir Pinjal about the beginning of April; during the passage an accident occurred, several of the elephants being pushed over the precipices, and many of the ladies of the royal zenana were killed on the spot. The Emperor remained three months in Cashmere; on his departure Ilsam Khan was appointed Soobahdar: it is recorded of this ruler that he rooted up all the mulberry trees which formerly grew in front of the great Eedgurh, as their fruit dropping, soiled the clothes of the faithful collected for prayers: however he planted the present magnificent chenar (plane) trees in their stead. Thus do Cashmere chronicles abound in the most insignificant facts affecting their native country. The following year (A. D. 1665,) Saif Khan was appointed to succeed, in whose time Hussein Mullick (son of Hyder Mullick the historian) was put to death by order of the emperor for speaking disrespectfully of the Prophet. Saif Khan was a stern tyrannical governor, but was soon succeeded by Mobazir Khan, (A. D. 1667,) during whose term of power the king of Kashgur passed through

Cashmere on his way to Mecca, and was, by order of the emperor, presented with half a lakh of Rupees (£5,000) and equipments for his pilgrimage. Mobazir Khan was himself a good well-intentioned man, but his Usbeg guards oppressed the people and even murdered many, on which account he was recalled by the emperor, (A. D. 1668,) and Saif Khan re-appointed governor. An earthquake occurred the following year, but did no great damage. Saif was succeeded by Iftikar Khan, (A. D. 1671,) but did not leave Cashmere, which he adopted as his residence, and where he seems to have held a sort of court. About this time a great fire again partially destroyed the Jumma Musjid and a great part of the city of Srinugger.

A. D. 1675.—Hawam-ood-deen Khan ruled three years. Ibrahim Khan was appointed a second time, (A. D. 1678.) He commenced his rule under unfavourable auspices; during the first year great floods, and the following year severe earthquakes did much damage to the country. Religious disturbances also broke out between the Shiah and Soonees; however, notwithstanding these domestic calamities, this governor invaded and conquered Thibet. He was succeeded by Hefzoola Khan, (A. D. 1685,) who, however, after a short sojourn, appointed Abul Futteh Khan as his Naib and proceeded to court. A famine occurred.

A. D. 1689.—Mozuffer Khan appointed governor. He proved to be a very tyrannical ruler, so much so, that the people showed signs of rebellion, and he was compelled to fly the country after ruling one and a half year; however, his brother Aboo-nusser Khan (A. D. 1691,) succeeded him, and he also was a tyrant. Fazil Khan (and Kasi Khan) succeeded (A. D. 1697) a good governor, who improved the city in many ways; during his time also a hair of the prophet Mahomed arrived from Mecca, and was deposited in the mosque at Hazrat-bul on the banks of the Bhut Dul. After being in power three and half years Fazil Khan was at his own request relieved by Ibrahim Khan A. D. 1701 (for the 3rd time). This governor was ordered by the emperor to invade Kashgur, but excused himself on the plea of insufficient means in men and money; upon this his successor was appointed, Nawasish Khan, who was on his way to assume his government when news of the emperor's death reached him, upon which he seems to have returned to Court, and never to

have reached Cashmere. The emperor Aurungzib died at the age of ninety-one (A. D. 1706,) in the year 1181 Hej. (دخل اليجنت ۱۱۸۱).

It is amusing to observe the extravagant praises which our orthodox historian Mahomed Azim, whom I have chiefly followed about this period, confers upon Aurungzebe, whom he infinitely prefers to the noble and enlightened Akbar, of whom he complains that he "treated all his subjects alike!" not favouring the Mahomedans above the Hindus.—Was ever a nobler tribute paid to a ruler? Shah Alum succeeded to the throne of Delhi, (A. D. 1706,) and despatched Jaffer Khan to relieve Nawazish Khan who does not seem to have assumed the functions of government; he proved to be a bad governor and a mob set fire to his residence.

He died at Cashmere of drink and excess, and, according to the record of his death, must be faring badly at present. جان جفرخان ۱۱۲۱ سنه ۱۱۲۱ contains the date Hejira 1121, (A. D. 1709).

The nobles now assembled and elected Aruf Khan Naib of the country, as a temporary measure, until the Emperor's pleasure should be known. Shah Alum (A. D. 1709,) accordingly appointed Ibrahim Khan, (fourth time) who was at this time governor of Kabool and Peshawar and who died shortly after his arrival in Cashmere; Aruf Khan thus remained Naib. Nawazish Khan now at length became governor. A great fire and floods occurred in his time. He was succeeded by Anatoola Khan (A. D. 1711,) who left Aruf Khan as his Naib, upon whose death however within the year, he appointed Mushuruf Khan, his own son-in-law, Naib, and himself departed on a pilgrimage to Mecca. He was however superseded on the accession of the Emperor Firokshere (1712) the following year. Anatoola Khan was of Cashmere descent. (A. D. 1712). This year Shah Alum died at the age of seventy-one, and was succeeded by his son Firokshere, whose mother was a Cashmerie.

His elder brother Jehandar Shah had gained possession of the throne for a few days and made the son of Anatoola Khan his Wuzzeer: Firokshere therefore on gaining the mastery put his brother to death and imprisoned the latter forty (40) days. He bestowed upon Syud Khan Bahadoor the Soobahdaree of Cashmere, who despatched Allie Mohamed Khan as his Naib. A rebellion broke out in the hills about Puklie which however was put down by

the Naib, who exercised such severities on the occasion that he was recalled, (A. D. 1714,) and Azim Khan appointed in his place: however, after an interval of one year Allie Mohamed was reinstated as Naib of Syud Khan Bahadoor, (A. D. 1716). Ehteram Khan succeeded as Naib for one year. Anatoola Khan now returned from Mecca, was received with distinction by the Emperor Firokshere, who conferred upon him the Soobahdaree of Cashmere; he accordingly sent (A. D. 1717,) Meer Ahmud Khan as his Naib. The practice of appointing Naibs seems now to have fairly come into fashion amongst the great nobles of the Mogul court, who looked upon their appointment solely as a vehicle of extorting money from their respective governments. We may conceive that the condition of a province thus governed was not generally happy. The present Soobahdar, however, seems to have been a conscientious man, and selected his Naibs with a view to the faithful government of the country; but the first of them Meer Ahmed Khan had scarcely arrived when his government was disturbed by a fanatic named Motavie Khan, who excited serious religious disturbances, which the Naib was unable to suppress. The second Naib .Abdoola Khan, (A. D. 1719,) who relieved him, met with no better success; at length the third Naib his successor Momind Khan succeeded in defeating and killing the fanatic Motavie Khan, but was still unequal to govern the country. Anatoola Khan meeting with no better success in the choice of his deputies, now requested to be relieved, and accordingly Saif-ood-dowlah (A. D. 1721,) was appointed to succeed him.

Meantime the throne of Delhi had been occupied by several puppet kings set up by Syud Hussan Allie Khan, Soobahdar of the Dekkan, who got the upper hand of the Emperor Firokshere, whom he imprisoned, blinded, and afterwards put to death.

A. D. 1718. The throne was then successively occupied by Ruffushan for five months and Ruffut-dowlah for six months, till in the year 1720, ظل رب سنه ۱۱۳۲, Mahomed Shah ascended the throne of Delhi, and soon after appointed Saif-ood-dowlah viceroy of Cashmere, who, however, only retained it six months; he then sent a Naib named Nujeeb Khan, who remained one year.

A. D. 1723.—This year Azim Khan was appointed Soobahdar; during his one year of power a famine occurred.

A. D. 1724.—Anatoola Khan now again (third time) undertook the government of the country, and appointed as his Naib Faqeer-ood-deen, who remained for a few months over the year, when his patron Anatoola Khan died and was succeeded in the Soobahdaree by Acheedat Khan. The latter despatched Abul Burkat as his Naib who remained three years until a successor to his patron was appointed, Soobahdar Agher Khan (A. D. 1728,) who assumed his government in person at Cashmere: he countenanced tyranny and exactions on the part of his subordinates, of which malpractices the Cashmeries laid a formal complaint before the Emperor, but meeting with no redress, they took the law into their own hands, and stoned the obnoxious viceroy out of the city of Srinugger. Soobahdar Ameer Khan succeeded and reappointed Abul Burkat, (A. D. 1729,) the former Naib of the country, but after two years he superseded him by Ehteram Khan, in whose time there were bread riots and several grain-holders lost their lives.

Encouraged by the new Naib's unpopularity, Abul Burkat now rebelled and forced Ehteram Khan to fly the country. The Soobahdar Ameer Khan was now dispossessed of Cashmere by the Emperor, and Dileer Khan of Paniput appointed to succeed him, (A. D. 1735;) the latter however died at Lahore on his way to assume his government. Ameer Khan therefore remained Soobahdar one year longer, but being worsted in a battle with a rebel Rajah Jafr Khan, he fled to Hindustan. This year also the country was deluged by great floods, and an earthquake which lasted for three months caused considerable damage.

A. D. 1736.—Juleel-ood-deen Khan was now appointed Soobahdar, but met with no better success than his predecessor, in governing the country. Cashmere in fact, perhaps through the influence of Nadir Shah who was at this time engaged in subduing Kabool and Peshawar, seems to have been in a very disturbed condition; however Fakr-ood-dowlah, a noble apparently in the interest of Nadir Shah, drove away the rebel Jafr Khan and his allies into their hills, assumed a sort of regal state in Cashmere and administered the government on his own responsibility. Meantime Utteehoola Khan (as son of Anatoola Khan) had been appointed Soobahdar by Mahomed Shah, and sent a son of Mushuruf Khan named Aswaim-

ood-deen Khan as his Naib. He, however, on arriving in Cashmere, was imprisoned by Fakr-ood-dowlah, who soon afterwards appointed his own Naib Kazie Khan and left the country.

During his absence the imprisoned Aswaim-ood-deen Khan (A. D. 1736,) managed to escape and to get the upper hand of Kazie Khan, who fled. Cashmere has now, since the beginning of the century, exhibited the spectacle of a province governed by the creatures of an absent ruler, himself the courtier of the supreme Emperor, who, in his turn, by this time of the declension of the Mogul power, was generally a mere puppet in other hands, and but little his own master. Observing this, it can scarcely excite surprise that the various Naibs should have taken advantage of the state of things, and endeavoured to render themselves more or less independent.

In fact from about this time we shall find most of the governors of Cashmere in common with those of the other provinces of the tottering Mogul throne, little short of independent rulers. In the year Hejira 1151, (A. D. 1738,) Nadir Shah having overrun Kabool and Peshawar, set out on his invasion of Hindustan, and on his arrival at Lahore was met by Fakr-ood-dowlah, whom he appointed viceroy of Cashmere, and then resumed his march towards Delhi. As his progress during the invasion belongs to the general history of India, we need not to follow it further than as it effects the province whose history is our subject. The battle of Paniput ensued, in which many Cashmerie nobles, officers of Mahomed Shah, were slain, and Delhi was subsequently sacked by the soldiers of Nadir Shah. After due submission to the conqueror, Mahomed Shah was reinstated on the throne, and thus Cashmere still remained a province of the Mogul empire.

Meantime Fakr-ood-dowlah had returned to Cashmere, of which he remained master for forty days, and coined in the name of Nadir Shah. The Cashmeries however, (A. D. 1738,) objecting to an Emperor of the Shiah sect, turned out his Soobahdar in an *éméute*, and, shortly afterwards the news arrived that Nadir Shah had spared the province to the Emperor Mahomed Shah, who in fact the following year bestowed the Soobahdaree on Anatoola Khan (A. D. 1739,) who appointed Abul Burkat his Naib, and followed in person three months afterwards. A quarrel soon ensued between

them and some fighting took place, which terminated in the death of the Soobahdar by the hand of an assassin. Abul Burkat, however, does not seem to have been privy to this act; indeed Mahomed Azim the historian of the period, expressly affirms his innocence.

A. D. 1740.—Abul Burkat having thus thrown off his allegiance, sought alliances amongst the surrounding tribes. The Rajah of Kishtewar especially sent troops to his assistance, and with their aid he succeeded in putting down all present opposition to his power. The usual effects of foreign alliances however soon developed themselves, and the Kishtewaries plundered the city and country. The following year a comet was visible in Cashmere, to oriental superstition ever associated with portents of war, or other extraordinary events.

A. D. 1741.—In fact the same year Asud Khan was commissioned by the Emperor to proceed to Cashmere and reduce the refractory Naib. At his instigation the Rajah of Paonch attacked Abul Burkat and his allies, 500 of whom fell in battle: notwithstanding this reverse however Abul Burkat still held out, (A. D. 1745,) nor was it till the arrival of Shere Jung Bahadur, the Naib of the Nazim Sufter Jung, that he, four years afterwards, was induced to surrender his government and present himself at the court of Delhi, where he died the same year. (Hej. 1158).

Shere Jung had scarcely remained six months when Afrasiab Khan succeeded as viceroy of Cashmere, (A. D. 1745,) over which he exercised a vigorous rule for nearly nine years. At this time the accumulated phenomena of ages would appear to have burst forth on the devoted inhabitants of the happy valley; during the two first years of Afrasiab Khan's government, a dreadful famine occurred, during which it is said that slaves sold for four pice (about a penny) each. The famine produced its natural result, a pestilence, which swept away many thousands of the people; an eclipse also added to their terror, and storms of rain followed by floods, carried away all the bridges.

In the year Hejira 1160, (A. D. 1747,) Nadir Shah was murdered, and his successor Ahmed Shah, having expressed some intention of visiting Cashmere, the nobles secretly despatched a



letter inviting him to take possession of the country ; the letter was however intercepted by Afrasiab, and the nobles finding their plans discovered, openly rebelled against the Soobahdar, and set up (A. D. 1747,) Asmutoola Khan as governor of Cashmere, for the Emperor Ahmed Shah Abd-allie ; he succeeded in gaining possession of the city for a day or two, (A. D. 1747,) when he was shot by a soldier of Afrasiab Khan who resumed the government, but died shortly afterwards by poison. His son Ahmed Allie Khan a boy, was maintained as his successor for one-half month ; after which Mullick Hussan Khan a Cashmerie was in power some three months, when the nobles wrote to Mahomed Shah to name some governor of the country. He accordingly appointed for the present, until his successor should arrive, Meer Ahmed Mokeem, who, however, after ruling five months, was attacked and driven away by Abul Kasim, a son of Abul Burkat.

A. D. 1752-3.—This year Ahmed Shah Abd-allie being at Lahore, the fugitive Meer Ahmed Mokeem presented himself before him and craved assistance. The Emperor accordingly despatched a force under Abdoola Khan Ashuk Akarsu to his aid. The Mogul governor fled at his approach, and the victorious Abdoola Khan, setting aside his powerless ally, seized the country, and, during the six months he remained as governor, plundered and extorted a crore of rupees from the unhappy valley already exhausted (A. D. 1752,) by pestilence and famine, with which he presented himself before his master Ahmed Shah ; having left Rajah Sookh Jewan as his mooktear. Cashmere thus passed from the sway of the Mogul throne, under that of the Dooranees, and we shall accordingly here close that portion of its history.

#### PART 4.—*Cashmere under the Dooranee Governors.*

A. D. 1753.—Abdoola Khan, the first Dooranee governor, having left Rajah Sookh Jewan as his mooktear departed from Cashmere, which was again desolated by a famine. No sooner, however, was his back (H. 1167,) turned, than a general impatience at Dooranee rule manifested itself. Rajah Sookh Jewan, placing himself at the head of the movement, began to form a confederacy amongst the surrounding hill tribes, and to entertain soldiery which gradually swelled

into an army of 40,000 men. Thus backed he considered himself powerful enough to resist Ahmed Shah to whom he refused to pay any tribute, and being a popular man and a good and just governor, seems to have aimed at rendering his country independent and himself a king; but a terrible punishment was in store for the ambitious Rajah. The wrath of Ahmed Shah (A. D. 1754,) had long been kindled against the refractory Cashmeries, but his attention had been distracted by more important matters, until on his return to Lahore in the year 1754 A. D. he was at leisure to turn his eyes towards the rebellious province and deemed it a favourable opportunity of chastising the leader of the insurrection.

He accordingly entered into an alliance with Runjeet Dehn of Jummo, guided by whose advice and aid he despatched an army under Noor-ood-deen Khan to invade Cashmere. Sookh Jewan collected his allies and advanced to meet him at the head of 50,000 men; he was however deserted by his nobles, seized and blinded by the successful Noor-ood-deen, who sent him in chains before the Emperor Ahmed Shah under whose horse and those of his courtiers the unfortunate man was trampled to death.

In his misfortunes he cried :

چشم از وضع جهان پوسیده به سر بسر احوال آن نا دیده به  
گردھی سیرس دید زهرت عوضی زین سیه مار جهان ترسیده به

A. D. 1754.—Noor-ood-deen Khan then became governor of Cashmere, over which he ruled with moderation for more than eight years; he was then recalled by Ahmed Shah, who replaced him by Bullund Khan Soodozie (A. D. 1762.) He proved a good governor, but endeavoured to restore the exhausted country and remitted all taxes, for which reason falling, like his predecessor, under Ahmed Shah's displeasure, he was recalled after two years, (A. D. 1764,) and the good Noor-ood-deen Khan installed a second time as governor. He, however, after a short time, hearing he was to be shortly superseded, anticipated his orders, and leaving his nephew Jan Mahomed Khan as Naib, proceeded to Kabool to plead his own cause before the Emperor. Nevertheless Ahmed Shah (A. D. 1765,) appointed Kurrum Khan governor, who retained for three months an uncertain tenure of power, his authority being resisted by a certain Lall Khan. Observing this, Faqueer Khunt attacked

Kurrum Khan, and drove him out of the country, after which he sacked the city of Srinugger. Noor-ood-deen Khan (A. D. 1766,) was now for the third time sent by the Emperor as the only person capable of managing the country. He advanced with a considerable army. Faqueer Khunt attempted to oppose him, but finding his force insufficient to face the enemy, fled to Bombah, where he died. Noor-ood-deen Khan now ruled with great severity one year; after three years he was again relieved by Kurrum Khan, (A. D. 1769,) who however, being a weak, timid man, was unable to control the turbulent spirits of Cashmere, and fled to Jummoo; whereupon his commander-in-chief Ameer Khan Sher Jewan seized the valley on his own account, and refused to send tribute to the Emperor: to strengthen his position he built the Sher Ghunie (thus named after himself and not Sheregurrie or Shiahgurrie). The island called Sona Lank also owes its origin to this chief. He also sought to ingratiate himself with the Hanjies or boatmen of Cashmere, who are in fact sturdy fellows whose cordial support might be useful to a well concerted defence of the valley. Ameer Khan seems, in fact, to have altogether thrown off his allegiance to Ahmed Shah, and to have maintained an independent court of his own; which he maintained until the death of Ahmed Shah Abd-allie; that Emperor's son, however, (A. D. 1773,) Timoor Shah, having succeeded to his father's throne of Kabool, despatched Hadjie Kurreemdad Khan as Nazim, backed by a large army to enforce submission. Ameer Khan met him at Baramoola and a battle ensued, which ended in the defeat of the latter, who fled to Kishtewar, but was seized and sent to Timoor Shah, who, however, pardoned him after a short time. Hadjie Kurreemdad Khan was governor of Cashmere six years, and died there. (A. D. 1776,) Shocks of an earthquake which lasted three months occurred during his rule. His son Asad Khan succeeded to the government, (A. D. 1783,) and soon discontinued the tribute to the Emperor. He was however a very cruel ruler, on which account a conspiracy to put him to death was formed against him by some of his household officers; he was wounded in the scuffle, but contrived to escape to the river, collected some troops and drove the conspirators into the fort, where he besieged them for seven days; after which, endeavouring to escape, they were

seized and burnt to death by the cruel Asad Khan, who now became more tyrannical than ever, and, according to the expression of the historian, "killed men like birds." Stories are told of his extreme cruelty; amongst others a story is current in Cashmere of his throwing into the fire his own infant child who it appears had offended his cleanliness. At length (H. 1200,) the Emperor Timoor Shah (A. D. 1785,) despatched an army against him under Muddud Khan Sakzie, who succeeded, after a long campaign, in defeating Asad Khan, who fled to Poonch, but receiving no asylum there, he shot himself. Muddud Khan then assumed the temporary government for four months, (A. D. 1787,) when Meerdad Khan Kasijie succeeded him, but died after seven months: Moola Jaffer Khan (A. D. 1788,) succeeded for three months; till the arrival of Jooma Khan Kasijie, who was governor for four years, during which period he went several times to pay his respects to the Emperor. He died in Cashmere, and Ramootoola Khan succeeded for three months and twelve days, (A. D. 1792). Meer Hazar Khan Kasijie was then appointed Soobahdar: but soon afterwards Timoor Shah died and was succeeded by his son Zeman Shah, (A. D. 1793.)

A. D. 1793.—Taking advantage of Timoor's death Meer Hazar refused tribute and set up for himself; upon which the new Emperor Zeman Shah despatched Mirza Khan, (al-Kozyie) the rebellious governor's father, to endeavour to bring him to his allegiance. Meer Hazar Khan however imprisoned his father on his arrival, and openly threw off all allegiance to the Emperor; who shortly afterwards sent an army under Ahmed Khan Shihungchee Bashee to bring him to his senses. Hazar Khan however closed the Baramoola road, and suspecting some of his Hindu retainers of treachery, bound them in large cooking vessels, (or boilers) and thus threw them into the river Jhelum. He was nevertheless defeated and fled to the city, where he took sanctuary in the Shah Hamedan Mosque, but he was enticed out, thrown into prison and sent before the Emperor. He had enjoyed power little more than a year.

Ahmed Khan after remaining three months in Cashmere was relieved by Kaffyat Khan, and proceeded to Kabool with Hazar Khan and some other prisoners. Kaffyat Khan after nine months

left the government in the hands of Buddur-ood-deen his Naib, but returned the following year. He was a very splendid ruler, by which perhaps he incurred the Emperor's displeasure, as the following year, he was superseded by Mahomed Khan Jewan Shere who, on arriving at the Sheregurrie, imprisoned Kaffyat Allie. The latter's party, however, headed by his kinsman Meer Khan, rebelled and released him shortly afterwards. (A. D. 1795). Things being in this state at Cashmere, Shah Zeman himself visited the country, accompanied by his Wuzzeer Sher Mahomed Khan Mooktar-ood-dowlah, and made prisoners of all the contending parties. After remaining eight days the Emperor departed, leaving the government in the hands of Abdoola Khan Kasijie, who ruled with judgment for the space of one year; when he went to pay his respects to Shah Zeman. It was about this time that the Wuzzeer Wuffadar Khan, who had in fact been instrumental in placing Shah Zeman on the throne of Kabool, defeated a conspiracy and put to death Sirfraz Khan (father of Dost Mahomed) and twenty-two others of the principal chiefs of the Barukzyies; Futteh Khan, eldest brother of Dost Mahomed, and a younger brother named Azim Khan alone escaping the massacre to Herat. Abdoola Khan having paid his respects at court returned to Cashmere, and cultivated the friendship and alliance of the nobles of that country.

A. D. 1796.—He also gradually entertained an army of 30,000 men, by which measures he incurred the jealousy of Wuffadar Khan Wuzzeer, and was suddenly recalled to Kabool, and imprisoned in the Bala Hissar: (A. D. 1800). On his road to Kabool he had married a daughter of the Rajah of Mozafferabad, to which chief, as well as his younger brother Attar Mahomed Khan, (whom he had left as Naib during his absence) he now wrote, ordering them to hold out the country against the new Naib Moola Ahmed Khan.

A. D. 1801.—Shah Zeman shortly afterwards invaded Hindustan, and had penetrated as far as Lahore, when the intelligence reached him that his own brother Mahomed Shah of Herat, together with the fugitive Futteh Khan, had invaded Kabool in his absence: he accordingly returned precipitately, abandoning men and guns on the road, which last were forthwith seized by Runjeet Sing, (A. D.

1801,) then rising into power. On his return to Kabool the unfortunate Zeman Shah was deserted by his nobles, seized, blinded, and imprisoned. His Wuzzeer Wuffadar Khan, by whose power he had been sustained so long, was put to death, and the triumph of the Barukzyies was complete. The unfortunate Zeman Shah in his misery composed some couplets, which have since passed into household words amongst his countrymen. I may here remark on the singular habit of orientals, on the approach of death or other misfortunes, like the fable of the dying swan, singing their own elegies in doleful strains; which are frequently gravely recorded by the native historians as matters of history. To return, however, to the more immediate history of Cashmere.

A. D. 1800.—Abdoola Khan had been confined in the Bala Hissar, and, as before stated, Moola Ahmed had been despatched as Naib to assume the government of Cashmere; but on his arrival, the latter was imprisoned by Attar Mahomed Khan, son of Abdoola Khan; who together with Futteh Khan Rajah of Mozafferabad, were now encouraged to resistance by the news of Shah Zeman's defeat and death.

A. D. 1801.—Nissar Khan also, the commandant of the Bala Hissar, released Abdoola Khan, and, following his fortunes, accompanied him to Cashmere, where he received a present of a lakh of rupees (£10,000) for this service. Abdoola Khan being thus reinstated in his government, seized many of the surrounding countries, enlisted soldiers, and sent no taxes to the new Emperor Mahomed Shah.

A. D. 1806.—At length that prince, being established on his throne, despatched an army under Wuzzeer Shere Mahomed Khan to bring Cashmere into subjection. This force was met by the army of Abdoola Khan, which occupied the strongholds guarding the Baramoola pass. Shere Mahomed at first entered into negotiation, and by means of cajolery and bribes, succeeded in passing Mozafferabad, and penetrating as far into the valley as Baramoola, (situated at the gorge of the pass leading into the valley,) without much opposition. The eyes of Abdoola Khan were, however, now opened to the approaching danger, and he gave battle at Baramoola in person. The engagement ended in his defeat, and he was forced

to take refuge in the mountains; and Shere Mahomed entered the city and assumed the government. Abdoola Khan was, however, tacitly allowed to return and take up his quarters in the city, where he shortly after died. Shere Mahomed then sent for the late Soobahdar's son Attar Mahomed Khan, who was cooped up in the fort of Beyrwa, appointed him Naib, and returned to Kabool, which was still distracted by the rival claims of the descendants of Timoor Shah. During the one year this governor remained at Cashmere, a crore of rupees came to the treasury from the country, owing to the unusual activity of trade and the influx of foreign merchants, &c.

افضل رحمانی سنه ۱۲۲۱

The ensuing year his successor, Akram Khan, was appointed who, on arrival, was defeated by Attar Mahomed, and his whole army made prisoners; the latter, however, made a mild use of his victory: he soon after presented each soldier with clothing and sent them back to Afghanistan. After this, Mahomed Shah did not think it advisable to disturb Attar Mahomed in his government, and the latter occupied his leisure in organizing his means of resistance.

A. D. 1807.—He repaired and strengthened the fort of the Koh-i-marán on the Harriparvat and built a strong fort at Mozafferabad, and several ghurries along the same road. His brother Jehandad Khan had also strengthened himself at Peshawar; he held the fort of Attock, and the family contemplated an organized resistance to the Barukzyies. During this period Kabool was convulsed by the rival claims of the Barukzyie and Suddoozyie factions. At length in the year H. 1227, (A. D. 1812,) Mahomed Shah sent his captive brother Soojah-ul-Moolk to Cashmere, where he was imprisoned in the fort of the Koh-i-marán.

On the retreat of Shah Zeman from Lahore in the year A. D. 1801, Runjeet Sing had risen rapidly into importance, and had consolidated a nation whose elements he found existing in the Punjab in a disjointed form. He was now in fact (A. D. 1813,) amongst the number of the princes of India, and was even deemed an ally worthy of the British Government. Thinking him a fit co-adjutor, Futteh Shah therefore, feeling himself unequal to the conquest of

Cashmere thus fortified by the Suddoozyie brothers, proceeded to Lahore towards the end of 1812 A. D. and entered into a treaty for a subsidiary force for the invasion of the recusant valley for which it was stipulated, Runjeet Sing was to receive eight lakhs of rupees yearly.

A. D. 1813.—Mokim Chund was accordingly sent in command of a force of 12,000 men ; which contingent, acting in concert with that of Futteh Khan, commenced an invasion of the country. Attar Mahomed drew out his forces for battle, but, being deserted by some of his officers, and suspecting treachery in others, he shut himself up in the Shereghurrie whilst his brother held out the Hari Parvat. However the enemy agreed to listen to terms, and, after an interview, Attar Mahomed, with his family and treasure, was allowed to depart peaceably for Peshawar ; and thus Futteh Khan gained possession of the country. (A. D. 1813.) After remaining there but little beyond three months, he set out to beseige Attock, in which fort Jehandar Khan, brother of the late governor, still held out against him. At the same time he dismissed his ally Mokim Chund, Runjeet's general, with the first instalment of the stipulated 8 lakhs, and appointed his own brother Azim Khan, Naib of the country.

No sooner however did he approach Attock than Jehandar Khan, who had previously sold the fort to Runjeet Singh, fled and joined the Sikhs, and the Sikh government refused to surrender that important stronghold. Enraged at this breach of good faith on the part of his ally, Futteh Khan now refused to fulfil the other stipulated terms of agreement and declared war. Mokim Chund also on his departure from Cashmere had released Shah Shooja, who accompanied him to Lahore where, he was detained as a prisoner till his escape to the British territory. (A. D. 1814.)

Runjeet Singh on the pretext that the eight lakhs of rupees was an annual tribute, now, at the head of a considerable army, invaded Cashmere in person.

The Sikh army arrived at Rajoorie on the 11th June, 1814, and equipped itself for hill warfare, before attempting to force the passes of the Pir Pinjal. The Rajah of Poonch (Rahoola Khan) had openly joined Azim Khan, the governor of Cashmere ; and Ugger Khan



Rajah of Rajoorie, (A. D. 1814,) had every disposition to do likewise, had not his country been already occupied by the enemy. As it was, he beguiled them by false intelligence and treacherous guides, and was thus perhaps more truly serviceable to the Cashmere party, than if he had openly joined them. It was determined that Runjeet Singh in person should lead the principal army by the Poonch road towards Toshee-maidan, whilst a diversion should be made by Barumgulla. This last, under Ram Dyal, gained the post at Barumgulla, but it was not till the middle of July that a general advance was made.

On the 13th of that month, however, Runjeet marched from Poonch, and reached Toshee-maidan on the 18th, where he found Mahomed Azim Khan and the Cashmere army, ready to receive him; and his hesitation in attacking on this occasion led to the disasters which followed. Meantime, Ram Dyal, having forced the Pir Pinjal, and defeated the Cashmere force which attacked him at Heerpore, advanced to Shupeyon; the first town in the valley, but was there surrounded, and only allowed to retire through the friendship of Azim Khan for Mokim Chund, the grandfather of that chief.

Runjeet Singh's army at the same time, being discouraged by the delay in attacking the enemy, had lost ground, and eventually been forced into a precipitate retreat to Poonch, with the loss of its baggage; Runjeet Singh quitted the camp and hurried to Lahore. The victorious Azim Khan now resumed the quiet discharge of his duties as Naib of the province, and, having suspicions that the Dewan Hurdoss had invited Runjeet Singh to invade the country, he put him to death. Runjeet Singh, however, seems to have been merely instigated by the wish of extorting the annual tribute of eight lakhs of rupees; which, after the first payment made to Mokim Chund, had been withheld by Azim Khan. The year following this unsuccessful invasion a severe famine occurred in Cashmere, and many perished. There was also a very severe winter: the lakes and rivers being all frozen over.

A. D. 1814.—The governor Azim Khan began now to oppress the Hindus, whom he suspected of a disposition favourable to the Sikhs. At length, after being in power six years, during which pe-

riod he had amassed two crores of rupees (£2,000,000) extorted from the unhappy country ; he left his brother (A. D. 1818,) Jubbar Khan as Naib and proceeded to Kabool, to the assistance of his eldest brother Futteh Khan, at that time a prisoner in the hands of the Sud-dozyies. He was, however, too late to prevent that high-spirited chieftain from being foully assassinated in the presence of (and by order of) the Shah. It does not fall to our province to trace the future career of Azim Khan : He subsequently became ruler of Kabool, when, misunderstandings occurring betwixt himself and Dost Mahomed Khan his younger brother, whose force of character he appears never to have fully recognized, he allowed, by his own indecision of character, the golden moments of opportunity to pass, and died of a broken heart 1823 A. D.

Jubbar Khan being left as Naib of Cashmere, (A. D. 1818,) evinced every disposition to govern well, and carried on his government with mercy and equity for the space of six months. After his unsuccessful invasion of Cashmere in the year 1814 A. D., Runjeet Singh had occupied himself in repairing the losses sustained by his arms, in punishing the hill Rajahs, and other allies of Azim Khan this side the Pir Pinjal, to whom he mainly attributed his repulse. At length in the spring of 1819 A. D., encouraged by his recent success against Mooltan, and instigated by Dewan Misr Chund and other advisers, he collected an army as numerous "as ants and locusts," (lit.) and invaded Cashmere a second time. Taught by former reverses, Runjeet Singh now adopted every precaution to ensure success ; he divided his army into three divisions ; the "advance" under Misr Dewan Chund ; the "support" under Prince Khurruk Singh ; and the "reserve" under Runjeet himself. By the month of June 1819, the Dewan had occupied Rajoorie, Poonch, and all the hills this side of the Pir Pinjal ; and on the 23rd by a simultaneous attack carried the positions of the Rajahs of those two states, who covered the passes : (A. D. 1819). At the same time Khurruk Singh's support occupied Poonch and Rajoorie. Meantime, the Cashmere governor Jubbar Khan, made some show of resistance ; he advanced in person as far as Heerpore, and sent forward troops to close the pass ; but his arrangements for defence were ill-concerted, as he allowed Dewan Misr Chund to turn his

position by a flank march, and to take up a favourable position in his rear at Deopore. There, however, he engaged the enemy with 5,000 men on the 5th July, but was wounded and defeated after a feeble action, and fled, with his Pathans, by the Baramoola pass towards the Indus. By this time, Runjeet Singh, with the reserve, had reached Rajoorie; but did not proceed to view his conquest, of which, indeed, he appears to have entertained a superstitious dread, and never visited in person. Dewan Misr Chund therefore advanced and occupied the city and country, which thus, after the lapse of nearly five centuries, again fell under the sway of a Hindu sovereign.

A. D. 1819.—The date is contained in the following Sikh War cry, the letters of which correspond to the Hindu year 1876 of the era of Vikramaditya.

بولوچي واہ گروجي کا خالصا بولوچي واہ گروجي کي فتح

#### PART 5.—*Cashmere under the Sikhs.*

The Sikh army under Dewan Misr Chund, having thus occupied Cashmere, Motee Ram (son of the late Dewan Mokim Chund) was appointed governor of the valley by Runjeet Singh. The surrounding countries, however, still remained in a disturbed state; several chiefs rebelled along the frontier; amongst others, Shere Zeman Khan of Gundguruh, (A. D. 1820,) against whom a force was sent, under Ram Dyal the governor's son, who was killed in action.

Ugger Khan also, the rebellious Rajah of Rajoorie, was in May, seized by Golaub Singh, who for this service obtained the Jageer of Jummo. In June the troops were relieved, and Hurrie Singh Nalooa succeeded Motee Ram as governor of Cashmere. At this time a certain Golaum Allie Kukka raised a force, and created some disturbance in the hills about Bombah; but was seized and imprisoned by Hurrie Singh, who, after governing the country two years, was relieved by Motee Ram (A. D. 1822,) for the second time. The latter however only remained one year when Goormuck Singh was appointed governor, his *peshkára* being Chuni Lall. (A. D. 1823). After two years, he also was relieved by Dewan Keerpa Ram (son of Motee Ram); in whose time the great earthquake occurred, which laid every house in the city low;

during the three months of its continuance, the shocks at first were not less than 100 per diem, after which they gradually diminished: the inhabitants lived entirely in tents. At this time the Rajah of Mosafferabad revolted, but was defeated and made prisoner by Keerpa Ram. This governor was very fond of display, but was nevertheless a good ruler. At length he excited the jealousy of Rajah Dhian Singh, the minister of Runjeet, who brought about his recall, (A. D. 1830;) the order summoning the governor to appear at the Lahore durbar and give an account of his stewardship, took him entirely by surprise; it arrived during a nocturnal fête, which he was enjoying with his suite at the Lank island, in the city lake, (locally, the dhull,) which he had illuminated for the occasion. This sudden disgrace, arriving thus in the hour of revel, greatly disconcerted the unfortunate Keerpa Ram, who nevertheless obeyed, and proceeded to Lahore, where he was imprisoned for a short time on the plea of embezzling the public money: subsequently his own and his father Motee Ram's estates being confiscated to make good the pretended deficit, he was released, and, soon after, resorted to that refuge of all disgraced Punjab functionaries, a pilgrimage to Hurdwar, where his subsequent poverty was the best argument for his innocence of the peculation attributed to him. He was succeeded (A. D. 1830,) as governor by Bumma Singh, in whose single year of power, disturbances occurred between the Shiahhs and Soonees.

A. D. 1831.—Prince Shere Singh (afterwards Maharajah) now assumed the government of Cashmere, and appointed Bisakur Singh his Dewan, who attended to the affairs of the country, whilst the Prince took his pleasure in field sports, to which he was much addicted. The Prince himself was an easy ruler, but neglected his charge, and allowed his Dewan to extort money on his own account. A great famine also at this time added to the miseries of the people, thousands of whom died, and many fled the country to Hindustan and the Punjab, where their wretched condition attracted the notice of Runjeet, who forthwith despatched Jemadar Kooshial Singh, with Bhae Goormukh Singh, and Sheikh Golaum Mohy-ood-deen, as a sort of committee to collect the revenue, and watch Shere Singh and his Dewan Bisakur Singh. Kooshial Singh (A. D. 1832,) on arrival, assumed the control of the finances from the Dewan, but the Prince

Shere Singh continued in the country as before following his favourite pursuits. Kooshial Singh, fully aware that a cash remittance was the most effectual method of convincing his master, old Runjeet, of his fitness for the commission entrusted to him, presently extorted twenty lakhs of rupees, besides pushmeenah and horses, from the already impoverished country: he was also a cruel man, and put many innocent people to death; happily for the country he departed after six months, and Colonel Meean Singh was selected by the Maharajah, on account of his humane character, as a fit governor for the unhappy valley. That officer, accordingly (A. D. 1833), proceeded towards Cashmere, but, finding that Prince Shere Singh had not yet seen fit to surrender his government, halted at Bara-moola a month. At length, that royal personage leisurely set out on his return to Lahore, after having misruled the country upwards of three years. Meean Singh then assumed the government, (A. D. 1833,) and set himself to work to repair the country, desolated by famine and oppression. He seems in fact to have been a kind and just man, who prevented his soldiers from oppressing the people. He was raised to the rank of general in 1836 A. D. as a mark of acknowledgment of his services.

In the year 1838 A. D. great floods occurred, which forced the people to take to their boats. In the following year A. D. 1839, Runjeet Singh died and was succeeded by Kurruck Singh, who followed his father ten months after. Noo Nihal Singh, Runjeet's grandson, was also killed by the fall of a gateway at Lahore: upon which a state of anarchy ensued amongst the rival Sikh Sirdars, a graphic picture of which has been portrayed by other hands, during all which struggles for power, however, Meean Singh remained quiet in his government of Cashmere; till at length he fell, in a mutiny of his troops, by the hand of one Jemadar Tellock Singh. (A. D. 1841). This mutiny was occasioned by that usual grievance amongst Asiatic armies, arrears of pay. Tellock Singh, having demanded payment of these arrears for his regiment, and being refused by the governor, immediately, as preconcerted, drew his tulwar, and calling upon Meean Singh to "go aloft" (that being the slang for death amongst the Sikhs) killed him on the spot. Thus perished the well meaning Meean Singh: intemperance and sen-

uality had however by this time gone far to obliterate the humane and just impulses with which he had commenced his career, and, in consequence of his gross appetites, his person had attained a most unwieldy and unseemly bulk. His son Sunt Singh escaped for the present to the fort of the Harrie Parwat, and thus saved his life; but he was delivered up and imprisoned by Tellock Singh, who forthwith sacked the treasury and put himself at the head of the rebellion. Meantime, Golaum Mohy-ood-deen (a Mahomedan) had been despatched as governor to relieve Meean Singh, by the new Maharajah Shere Singh of Lahore, but on arriving at Shupeyon (A. D. 1841,) in progress to join, finding that the Shere Ghurrie was in possession of the rebels, he halted, and wrote for assistance. Rajah Golab Singh of Jummoo, and other Sirdars, were now despatched to put down the mutineers; which they succeeded in effecting after several desperate engagements, in which the rebels were nearly all slain.

A. D. 1842.—Golaum Mohy-ood-deen was now installed as governor of Cashmere, under the sounding title of Nizam-ul-moolk-Etamaad-ood-dowlah. A comet appeared in this last year of the 18th century of Vikramaditya. To the superstition of Asiatics, these "wandering light stars" ever appear ominous of war and evil to the mighty of the land; and the events of the next six years well nigh justified the predictions of the Punjab astrologers in the present instance.

During the summer of this year, (A. D. 1842,) Golab Singh remained a month, engaged in collecting and forwarding supplies to his troops, employed at this time under the famous Zorawar Singh, in reducing Thibet, to whose trade in Shawl-wool, &c. this merchant Prince had early set his eye. Soon after this, Golaum Mohy-ood-deen sent an expedition to Gilgit, which was, however, defeated with loss. Encouraged by this success, the Rajahs of Mosafferabad, Kurnah, and Kotyhar, had combined their forces, and pressed the governor so hard that he was fain to apply for assistance from Lahore. Upon this his son Sheikh Emám-ood-deen (who received the title of Ameer-ul-moolk Jung Bahadur) was despatched by Maharajah Heera Singh, who had succeeded to the guddie, with an army of 15,000 men to his assistance. On the

approach of this overwhelming reinforcement, the rebels dispersed ; and the Sheikh went to pay his respects to his father, (A. D. 1843,) who raised him to be his associate in the government. In the time of Mohy-ood-deen, the cholera created great havoc among the inhabitants, no less than 23,000 of whom are said to have died in the city alone.

At length Golaum Mohy-ood-deen, being in an infirm state of health, appointed his son (A. D. 1845,) Sheikh Emám-ood-deen governor of Cashmere, and proceeded towards Lahore to pay his respects at court. He was, however, taken ill on the road, returned to Cashmere, and there died (A. D. 1845,) after ruling the country five years.

Now comes the Sikh Campaign of the Sutlej, and the establishment of Dhullip Singh on the throne of Lahore, with Lall Singh as minister ; Cashmere being made over to Golab Singh "for a consideration." On the approach, however, (A. D. 1846,) of Golab Singh's general to take possession, the governor Sheikh Emám-ood-deen, acting under secret instructions from the Lahore durbar, refused to surrender his trust, and succeeded in beating back Golab Singh's troops ; and even advanced 3,000 men, with two guns, under Rajah Fuqueeroola Khan of Rajoorie, in pursuit. He was however induced to surrender, and Maharajah Golab Singh of Jummoo became independent ruler of Cashmere and the hills.

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*Notes on the Topography of Murree, by Dr. A. GORDON, H. M.  
10th Foot.*

*Geographical Position.*—The new sanatorium of Murree is situated on a mountain ridge in the Hazarah country; its precise geographical position being  $34^{\circ}$  N. Latitude,  $73^{\circ} 2'$  East Longitude,—and its altitude above the level of the ocean variously estimated at 7,500 to 8,000 feet.

*Aspect of the Station.*—The general appearance of the station is rendered striking, not so much by the grandeur of its scenery as from the manner in which the residents' houses are dotted about irregularly on the various prominences and acclivities, some half hid in the dense forest vegetation which clothes the more sheltered places, and others exposed on bare projecting rocks.

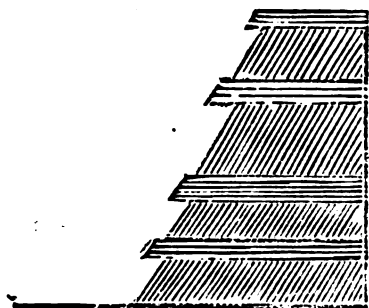
*General position of Barracks and Hospital.*—The barracks and hospital occupy the summit of the ridge, whose general direction is as near as may be N. and S. The private houses are built at various elevations on its western face, the bazaar and natives' huts being on the eastern. From the highest point, where it is proposed to erect an observatory, a very extensive view may, in tolerably clear weather, be obtained. To the East and N. East the Cashmere hills may be seen. Those of Cabul and Afghanistan can be traced more to the westward. To the South, the Indus, although at a distance of 80 miles in a direct line, is distinctly visible, and in the East the river Jhelum. The station of Rawul Pindie also may readily be distinguished.

*Character of Mountains.*—The general appearance of the numerous precipitous mountain masses that rise in wild confusion at and around Murree, presents unequivocal traces of the action of those disturbing forces which are still in active operation in that portion of Asia comprised between Cutch, Herat, Cabul and Afghanistan.

*Terraced faces of Hills.*—That they have been elevated by successive heaves from below, occurring at intervals of various and uncertain length appears to be clearly indicated by the terraced



Fig. 1.



faces of each, as is endeavoured to be shown in the accompanying sketch, in which the individual terraces are indicated as being of various height and breadth as they occur, and it may be noted that the few patches of cultivation, being on these terraces at the lower part of each hill, give them a very distinct

and unequivocal appearance.

*Valleys.*—Intersecting these abrupt hills occur deep valleys in which streams of clear calcareous water run with more or less rapidity over rocky beds; bringing with them boulders and irregular fragments of stone of all sizes. The valleys do not appear however to run in any definite direction but wind about irregularly, giving to each rocky ridge an isolated appearance as if totally unconnected with those immediately adjoining—and in addition to the principal line of valley, each individual slope is grooved as it were by the waste of the softer rocks by the elements; the dells thus produced being of very variable depth and precipitancy, but almost all clothed with dense brushwood and tall magnificent forest trees interspersed.

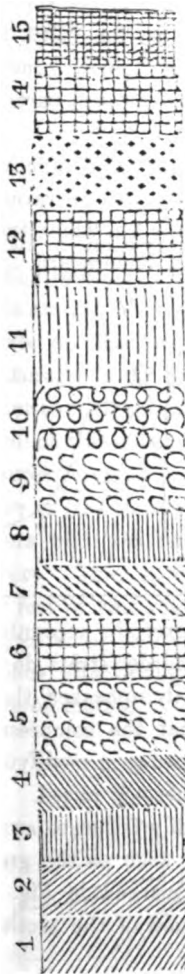
*Soil.*—The soil is not deep, but rich and prolific in the extreme: it consists of red alluvial loam intermixed with micaceous sand and containing in some places calcareous nodules as of marl both green and grey, and of kunkur.

*Geological Age of Rocks.*—The rocks constituting these hills belong to a modern period; the oldest being apparently of a date not earlier than the Eocene, but the greater portion evidently diluvial and alluvial deposits. These may, for the sake of convenience of description, be divided into two classes,—namely, the sandstone, and the calcareous.

1. *Sandstone rocks.*—The sandstone rocks constitute the ridge upon which Murree station is built, and includes a variety of substances of greater or less consistence throughout all stages from soft argillaceous mud to hard grey micaceous sandstone fit for building purposes.

*Section made by a new road.*—A new road, which, for the convenience of horse and foot passengers, is being cut along the face of the hill, reveals each individual stratum; and the following diagram, taken during a walk along it, will show the succession of these in a distance of half a mile.

Fig. 2.



*Section 1. Blue sandstone.*

2 and 3. Red clayey sandstone with green marl, the strata having different dips.

4. Red clayey sandstone without green marl.

5. Boulders of grey sandstone with stalactites in their interspaces.

6. Red argillaceous mould.

7. Grey sandstone with nodules of oxide of iron.

8. Ditto ditto without iron.

9. Boulders of grey sandstone.

10. Ditto of red sandstone with organic remains (shells).

11. Reddish sandstone containing streaks of carbonate of lime.

12. Argillaceous soil on red nodulated ferruginous rock of various consistence, with a few nodules of green marl and kunkur.

13. Brecciated clayey ferruginous stone with organic remains.

14. Red argillaceous loam.

15. Grey ditto ditto on soft grey sandstone.

*Remarks on Section.*—The above diagram is intended to represent the succession of vertical strata exposed during the formation of the narrow road to which allusion has just been made; the lower extremity (at 1,) representing the northern end of the road and the upper end (at 15,) the southern—the whole space therein comprised including one of those

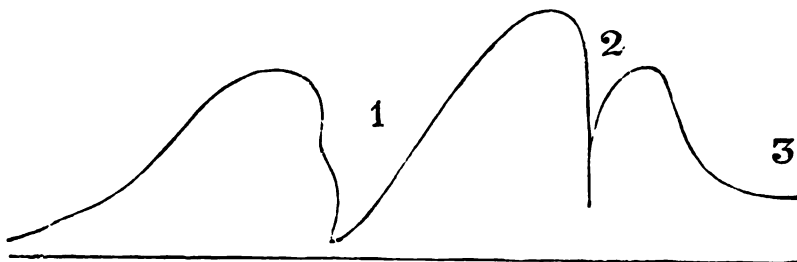
minor gorges on the mountain side that have already been described, around the upper portion of which the road winds.

In those cases where the dip of strata has been various, it has been represented in the sketch, and with reference to the figures, it will be immediately discovered how very great a variety of modern sandstone and argillaceous deposits is displayed in this short section.

*Smaller ravines how formed.*—As might be expected, the smaller ravines are formed in the softer substances, such as Nos. 6, 12, 14, and 15; the harder materials noted by the other figures forming promontories on the hill face around which the road at such parts is made to bend.

*Serrated appearance of Hills.*—It would appear as if different portions of the above line of strata had been subjected to various degrees of elevating force, so that the summit of the hill which they form has an irregular serrated appearance as shown underneath.

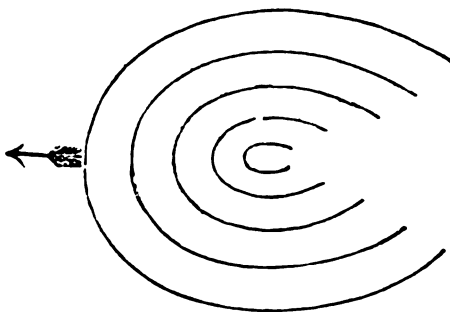
Fig. 3.



*Causes which give rise to this.*—This may, however, be accounted for by another series of causes, for although the harder strata do in reality appear to have been originally more violently upheaved than the softer materials, it must be borne in mind that the compressibility of the latter would have a considerable influence in modifying the extent to which parts formed of these would become raised. It is also evident that the elements would more readily triturate away valleys in the softer substances than in hard rock such as the grey and ferruginous sandstone, so that the gorges marked in Fig. 3, respectively 1, 2 and 3, correspond with the portions of the section marked 6, 12, 14 and 15, in Fig. 2.

*Specimen of sandstone how deposited.*—At the point marked 9 in Fig. 2, a very interesting specimen of sandstone occurs, its exposed

Fig. 4.

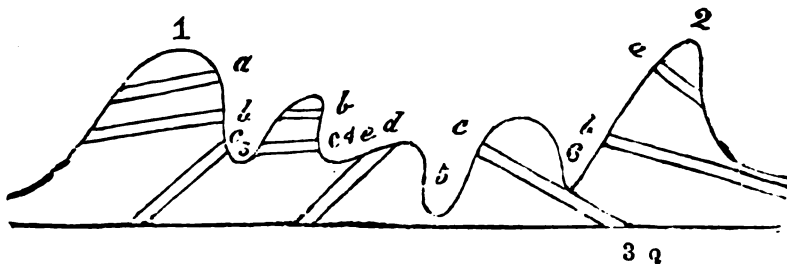


face presenting numerous concentric lines as represented in the margin, showing that the rock was originally deposited in an eddy, but it does not appear that any foreign substance of either animal or vegetable origin

exists in the centre so as to have formed a nucleus.

*Continuity of Hills destroyed and how.*—On examining the various hills around Murree and carefully noting the outcrop of individual strata on the face of adjoining ones, it becomes evident that their continuity must have been destroyed at a period considerably posterior to their solidification,—and that two distinct forces combined to produce this effect is equally clear. In the first place there are deep fissures running irregularly in the rocks, with individual portions more or less elevated than the general line of rock, showing that the layers were shattered and displaced by forces of a subterranean nature. Then again, we find terraces with intervening cliffs of a few feet or yards in height with boulders of all sizes, showing marks of greater or less attrition in the bottoms and on the sides of the various intervening valleys—thus evincing the effect of water in a state of motion.

Fig. 5.



*Outcrops of Strata.*—The above section is intended to represent the appearance of outcrops of strata on the various mountain faces in the vicinity of Murree, and they will be readily recognised as occupying that position which a fracture would exhibit if produced by force from below, tearing asunder the strata as shown at the points marked a and b, and thus producing “a valley of elevation” such as is included between the mountain peaks 1, and 2.

It is almost needless to observe in this place that the strata above represented do not include the whole number that actually exist on the hill faces,—the object aimed at in the sketch being nothing more than to illustrate the theory of their formation now being discussed.

*Materials represented in sketch.*—The bands noted a and b may be also looked upon as representing the micaceous and clayey ferruginous sandstone which seem to constitute the great mass of the Murree hills, but as has already been stated boulders and more or less perfectly consolidated strata of clayey conglomerate containing nodules of brown iron exist towards the lower portion of these, and such strata may in a theoretic section be represented by that marked c, while the bottoms of the gorges 3, 4, 5 and 6, would be framed more or less thickly with débris of such materials,—and accordingly this is in reality found to be the case, the fragments of stone found there consisting of the same materials confusedly blended together—that constitute the substance of the neighbouring hills.

2. *Calcareous rocks, position and presumed age.*—Calcareous rocks appear to prevail to a considerable extent in the hills around Murree, although only to a small extent in that on which the station has been established. In Fig. 5, the low round hill marked d is almost entirely comprised of this formation, the underlying rock consisting of impure limestone, apparently of the Eocene period,—covered with superimposed layers of fibrous gypsum which occur in definite lines as represented by that marked e, and lying more or less conformably upon the deeper material.

In some parts, the gypsum is tinged of a rose colour, but generally speaking it is transparent and colourless. The dip of its strata is 30° or 35° from West or nearly so, to East, the line of strike being as nearly as possible North and South.

In addition to this more perfectly formed gypsum there are at the

same time found considerable quantities in a less perfectly crystallized condition, and of an impure nature, but evincing marks of deposition from igneous solution in the alternating layers of the ashy-like calcareous matter, with intervening streaks of dark clayey substance, which the fractured surface of a specimen presents.

My opportunities for observation having been very limited, it was not in my power to extend my investigations beyond the immediate vicinity of the station; but two points of considerable importance have come to my knowledge with regard to the geology of this range of hills,—namely, that a thermal spring exists within some twelve or fifteen miles of Murree from which it is worthy of inquiry whether any calcareous deposits now take place,—the other point is that a fossil bone of a large animal, supposed to be of one of the gigantic *Pachydermata* of the later Tertiary period has been discovered at about a corresponding distance in an opposite direction.

*Meteorology.*—No extended observations have as yet been made regarding the meteorology of Murree, as the sanatorium has so lately been established there. It is hoped however that the register taken from the daily observations made at the hospital there for the five months from May to September 1852 inclusive, will, if compared with similar observations made during the same period at Wuzzeerabad, show the contrast between the temperature at that place, and in the plains of upper India, while a similar register being inserted of the range of the thermometer in the united kingdom will, it is hoped, render the comparison still more extended and complete. The latter however must refer to Dublin in 1844, as no observations for any other place or time are at present available.

Day of Month.	May.						June.						July.						August.						September.					
	Wuzzeerabad. 1852.			Dublin. 1844.			Murree. 1852.			Wuzzeerabad. 1852.			Dublin. 1844.			Murree. 1852.			Wuzzeerabad. 1852.			Dublin. 1844.			Murree. 1852.			Wuzzeerabad. 1852.		
	Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.		Max.	Min.	
1	63.54	94	70	65	45	62.58	84	80	60	44	72.62	100	87	66	49	64.62	84	81	62	48	70.64	100	85	74	50		100	85	74	50
2	61.56	98	72	66	46	68.62	96	72	63	46	76.64	92	85	58	47	66.64	85	78	67	49	70.66	100	82	76	53		100	82	76	53
3	68.57	104	78	67	50	68.66	92	81	60	51	74.68	101	84	66	49	68.61	87	78	70	56	70.66	98	84	72	46		98	84	72	46
4	70.60	106	80	68	56	63.62	102	72	63	52	74.69	94	86	68	52	66.62	90	82	68	48	67.64	100	88	68	58		100	88	68	58
5	70.62	107	81	63	44	70.66	106	78	68	55	68.62	100	84	63	53	68.64	91	82	66	46	64.62	100	88	69	60		100	88	69	60
6	70.64	109	85	67	45	74.68	106	82	69	54	68.62	100	84	55	52	68.66	91	83	61	55	65.64	90	87	67	61		90	87	67	61
7	70.62	108	84	67	44	74.66	106	82	68	55	70.64	103	82	56	44	68.64	97	82	62	52	66.64	94	84	70	58		94	84	70	58
8	72.62	108	82	64	43	73.66	104	84	63	55	72.66	100	83	68	55	66.64	83	81	66	52	66.62	89	85	69	55		89	85	69	55
9	74.64	112	83	64	46	74.68	106	86	69	53	74.68	102	84	68	54	68.64	93	81	65	52	66.64	94	82	66	50		94	82	66	50
10	75.68	101	87	61	42	70.70	106	87	63	47	74.66	104	85	68	53	68.64	89	83	65	51	67.66	94	85	58	50		94	85	58	50
11	66.65	107	85	61	44	70.68	107	89	69	50	76.68	106	90	67	54	68.62	91	84	65	52	64.62	96	82	63	55		96	82	63	55
12	60.59	99	81	64	47	78.68	107	91	70	51	78.70	107	90	67	53	70.66	85	83	65	55	64.62	97	82	61	53		97	82	61	53
13	56.54	100	85	71	50	76.72	109	92	71	55	79.70	103	92	67	53	70.68	96	81	64	54	66.62	98	82	64	51		98	82	64	51
14	66.54	100	82	68	57	79.63	104	86	68	51	72.68	100	84	63	54	68.66	90	83	66	52	68.64	99	82	62	56		99	82	62	56
15	68.56	98	71	68	43	72.66	103	91	69	48	72.68	101	87	58	52	68.64	95	82	65	53	68.64	99	82	70	61		99	82	70	61
16	68.66	106	81	65	43	72.66	104	86	67	45	72.68	98	89	69	48	70.66	97	81	63	43	66.60	96	84	66	55		96	84	66	55
17	69.62	103	80	57	44	68.66	97	83	64	50	70.68	102	89	71	47	70.66	95	82	68	53	66.62	96	74	66	55		96	74	66	55
18	66.58	89	84	56	32	72.63	104	86	58	52	71.66	101	88	62	49	66.62	90	82	65	42	64.62	97	82	57	46		97	82	57	46
19	58.54	89	73	55	39	76.68	108	88	60	45	74.68	104	88	61	48	64.61	96	87	66	44	65.63	100	82	62	45		100	82	62	45
20	54.49	86	71	58	48	78.68	106	91	67	52	72.70	99	88	62	47	68.62	97	86	70	56	66.62	97	80	60	51		97	80	60	51
21	52.49	75	67	63	46	78.68	105	92	70	58	72.66	102	89	77	54	64.60	84	79	65	46	67.60	98	80	50	45		98	80	50	45
22	56.48	83	66	65	50	72.66	106	95	68	56	72.66	102	89	77	54	64.60	84	79	63	51	67.58	97	82	59	42		97	82	59	42
23	59.52	87	72	69	48	70.66	94	83	70	57	74.70	103	92	81	57	66.62	94	81	60	48	67.58	94	82	58	43		94	82	58	43
24	49.46	88	75	70	50	72.66	95	84	69	56	70.66	84	93	81	61	68.64	96	84	62	52	65.59	95	76	58	48		95	76	58	48
25	52.48	86	69	68	55	74.68	102	89	71	53	66.64	99	82	76	54	68.64	91	87	67	50	68.59	95	74	58	38		95	74	58	38
26	52.18	82	71	64	47	76.68	100	86	73	57	67.66	90	83	68	56	68.64	97	12	65	53	68.58	96	74	66	42		96	74	66	42
27	52.48	82	68	60	42	73.66	99	88	60	53	68.64	85	81	73	54	69.68	94	82	60	48	69.58	97	72	63	52		97	72	63	52
28	58.51	92	69	63	43	66.62	98	79	67	47	68.62	85	82	74	60	68.64	94	82	66	45	69.59	99	77	64	57		99	77	64	57
29	63.54	100	71	64	44	70.62	98	83	70	50	68.64	89	82	69	51	66.64	92	81	66	50	68.58	99	77	60	41		99	77	60	41
30	66.56	101	77	66	42	72.64	93	83	70	50	68.62	87	84	71	55	66.64	93	81	68	48	68.56	98	76	59	30		98	76	59	30
31	66.60	101	72	60	44	0	0	0	0	0	66.64	82	81	67	53	66.64	95	84	76	48	0	0	0	0	0		0	0	0	0

*Approximation of temperature to that of Dublin.*—A bare register of the state of the thermometer gives but a very imperfect idea of the meteorological condition of any locality, and it is to be regretted that observations on more extended scales are not regularly taken at Murree. From the preceding table, however, not only may the temperature of this sanatorium be contrasted with that of a considerable military station in the plains of upper India, but a comparison may readily be established between it and that of one of the most important cities of the united kingdom,—such comparison will show, that during five months of the year at least, the difference in temperature indicated by the thermometer (in the shade) is but a mere trifle between Dublin and Murree.

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*Note on the present state of the Excavations at Sárnáth.*—By  
E. THOMAS, Esq., C. S.

On Major Kittoe's departure from Benares in January, 1853, I undertook, during my brief stay at that station, to continue his Archæological operations, so far as they related to the laying open of the inhumed remains of the old Buddhist Monastery at Sárnáth.

At the moment of engaging in this mere mechanical occupation, I trusted that Major Kittoe would, himself, be able to give to the world his own conclusions as to the date and associations of his interesting discovery. I abstained therefore, from even making myself his scholar, preferring alike to form an independent opinion which might follow the developments of the progressive explorations, and still more definitively desiring to avoid any possible appropriation of his varied antiquarian lore; I was, I felt, placed in a delicate position, I came to the work as a simple amateur, he had been professionally entertained as the Government "Archæological Enquirer."

Such members of our Society, as were then present in Calcutta, will call to mind that shortly after this, on his way homeward, Major Kittoe delivered a lecture on Sárnáth, at one of the Society's monthly meetings. No résumé of this discourse has as yet been embodied in *our* transactions—and otherwise I fear that of the



extensive collection of relics and ancient objects—of the varied accumulation of drawings, facsimiles and transcripts of antiquarian remains, made with such accurate nicety, by that devoted admirer of things of olden time—but little is now left that is readily susceptible of publication.

I should not now have ventured into the pages of the Journal Asiatic Society of Bengal as the unprepared exponent of immature theories or the mere chronicler of certain lines of old walls, uncovered in continuation of previous operations, had it not been, that on my departure from Benares, feeling myself bound to submit to the late Mr. Thomason a report of the progress, such as it was, that had been made in an undertaking he had expressed a lively interest in, and which had been carried on not only under the auspices, but with the direct aid of Government, I forwarded to his honor, as the result of my temporary superintendence, my original sketch plan of the excavations, corrected and added to, as it had been, from time to time as new walls or chambers were unearthed. This rough outline was accompanied by a private note alluding to the limited discoveries made, and suggesting the most favourable direction for future exploration, should opportunity offer for continuing operations. In short, I submitted a mere working plan of the present state of the diggings, with brief explanatory MS. references. Mr. Thomason did me the honor to place these imperfect documents on Official record, and at the same time expressed a wish, that a notice on the subject should be published in this Journal.

It is in fulfilment of that desire, that I now, at the eleventh hour, under the pressure of heavy public duties—forward this sketch. The ground plan of the inner square of the Monastery is sufficiently illustrated in the accompanying lithograph, an imperfect idea of the elevation may be gathered by observing the depth of the various walls noted on the plan—but the general profile of the inhumed edifice and the covering débris require momentary notice.

The excavations already completed, viewed with reference to the substances of which the covering bodies were severally composed—tends to show that previous to the erection of the comparatively modern building (colored *lake* in the lithograph) with which we are more immediately concerned—and without at present adverting to

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the lower walls (distinguished by *neutral tint*), the general line of the original bank sloped from east to west and that the later monastery was erected on the slope of the shelving bank forming the westward face of the *Khérah* or natural mound, to the extreme eastward of which is situated the celebrated *Tope*, which dates from a far earlier period.\*

The outline profile therefore of that portion of the accumulations, which served to fill in the higher but unequal line of the broken walls now exposed, formed, by subsequent deposits, a mere continuation to the westward of that face of the original bank, taking however a more gradual slope than the sides of the clean earth mound appear to have done.

In brief summary of the nature of the materials removed during the progress of the excavations, I may note unmixed earthen soil

\* Major Cunningham in reply to my enquiries regarding his extensive Sárnáth researches of older days, sends me the following items of information :

' When I got your letter I could not lay my hands upon my Sárnáth papers, and when I did find them, there did not appear to be any thing that would be of use to you. I opened the great *Tope* in January, 1835 : and made numerous excavations all round it. I cleared out the remains of the *Tope*, in which Jagat Singh, the Dewán of Cheit Singh, had found the relics—and I drove a shaft down the centre of the large brick *Tope* called Chokaudi. I found about one hundred statues and bas reliefs, of which all that were worth preserving were presented by me to the Asiatic Society of Bengal.

' Connected with Sárnáth there are two great facts which should be brought prominently forward. The first is the size of the building, which Wilford has stated to be 30 feet high, and which Wilson and others have repeated—whereas it is 110 feet high above the ruins, and about 130 feet above the plain, I measured it with a theodolite, 109 feet 10 inches, and afterwards with an iron chain, when I had finished the scaffolding, 110 feet.

' The other point regarding Sárnáth is its age, and here again Wilford has misled every one. The inscription which he published was found by Jagat Singh, and removed to the tank at *Jagatganj*, where Kittoe afterwards found it. This inscription is on the pedestal of a statue and bears reference only to the erection and dedication of the statue in the tenth century, and has no connexion whatever with any of the *Topes*. The great *Tope*, to judge by the alphabetical characters of the inscribed slab which I found inside it must date as early as A. D. 600—700—and I feel certain that it is the very lofty *Tope* seen by Hwan Thsang in A. D. 640 in the Deer Park. As *Sárang* is a Deer, perhaps Sárnáth may be only a contraction of Sáranganáth.'

at the line indicated by the letters *N. W.* at the S. East corner of the clearings. The modern half-wall, erected upon the remains of the more ancient edifice, was evidently built into an already existing bank consisting, at the point of contact, of a débris of broken bricks, &c.

The masonry of this wall is regular on the inner face, forming the one side of the small chamber—but is left rough and irregular on the surface covered by the bank—the chambers on the eastern side of the square were found filled in with a strange medley of uncooked food, hastily abandoned on their floors—pottery of every day life, nodes of brass produced apparently by the melting down of the cooking vessels in common use—above these again were the remnants of the charred timbers of the roof—with iron nails still remaining in them—above which again appeared broken bricks mixed with earth and rubbish to the height of the extant wall, some 6 feet from the original flooring—every item here bore evidence of a complete conflagration and so intense seems to have been the heat that in portions of the wall still standing the clay, which formed the substitute for lime in binding the brickwork, is baked to a similar consistency with the bricks themselves. In short, all existing indications lead to a necessary inference that the destruction of the building, by whomsoever caused, was effected by fire applied by the hand of an exterminating adversary, rather than by any ordinary accidental conflagration. Had the latter been the cause of the results now observed, it is scarcely to be supposed that so well-peopled a convent, so time-hallowed a shrine, should have been so hastily and completely abandoned. In front of these chambers we see traces of a verandah, and, at the N. east corner, we again observe the ancient walls performing the part of foundations for their modern successors; there would seem to have been an outlet from the main square at this point, though as far as the excavations have yet been extended in this direction, it is difficult to say where this passage led to, inasmuch as on the east we encounter a mere retaining wall, supporting a corner of the high bank—and on the north we meet with a singular elbow-shaped superficial continuation of the outer wall of the main building; what this strange angular affair may indicate, or how far it may extend into the bank must for the present be allowed to pass.

The outline of the complete square will however, be seen to have been preserved, as far as the foundations go, to the outside of the doorway-block, and the line is further continued through the thick angular wall, at which point the deep foundations cease. Passing by three ordinary chambers on the northern face, we come to one of the image houses—the entrance is from the inner square—the brick and the stone platform may both be supposed to have formed pedestals of erect statues of Buddha; the retreated wall in the corner, between these platforms, combined with the otherwise apparently isolated position of the second platform chamber adjoining towards the north, would have led to the idea that the wall had been pierced for the purpose of communication between one chamber and the other, but as far as the standing walls admit of a decision on the point, there certainly was no doorway at this spot, whatever means of oral or ocular communication may have existed in the screen at a higher level.

Such portion of the western face of the Monastery as has yet been exposed seems to have consisted of cells. These bear less trace of fire than those on the opposite side of the square, but on the other hand a much smaller proportion of their walls remains standing, seeming as if this side of the building, situated as it was on the more exposed slope of the bank, was less early inhumed; indeed as far as can be seen the S. W. corner has been almost entirely swept away, its surviving portions having been covered in at a much later period by the gradual operation of the manufacture of pottery, &c., whose kilns for the supply of successive generations have been pushed on in this direction to meet the prevailing wind. At this corner we again find traces of the verandah of the court and the centre chamber on the southern aspect brings us to the shrine: all that now remains, is the square, elaborately-corniced block in the centre of the chamber, which formed the *Singhásun* or throne for the seated figure of Buddha. The wall to the rear of the statue has been completely destroyed, but the original opening in front of the *Singhásun* is seen to have been enlarged beyond the breadth of the other doorways, probably to afford a free view of the object of worship without necessitating too near an approach on the part of the ordinary votaries.

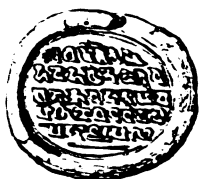
I now proceed to notice such objects of interest as have been met with during the operations.

Most prominent among these are the small *chaityas* depicted as figs. 6 and 7. Fig. 6, displays the *chaitya* as deposited in its complete state, its seal inscription of fragile clay encircled by and preserved within the mass of subsequently baked clay, which itself is adapted to a religious form of outline; fig. 7, shows the offering when subjected to the hammer of the curious antiquary and develops to us the clay seals, of which 1, 2 and 3, offer varieties. These examples contribute the only three modifications in the style of writing that I have been able to detect, amid the produce of several hundreds of *chaityas*. I had designed that the engravings should show the precise variations of the form of alphabet and exhibit the style of execution peculiar to each, but I must confess that I cannot pretend to illustrate my theme with such imperfect representations as Calcutta Lithography supplies; indeed, to own the truth, I myself have been obliged to refer in many instances to nearly identical originals in my own possession in order to discover what letters the artist designed to express! As the supposed facsimiles will not admit of my readers forming an opinion of the age of this writing, nor for my illustrating its variations, I shall content myself with remarking that Col. Sykes\* assigns the Palæography to *any* period "between the 7th and 10th centuries," an open proposition enough, and one we need not now contest!

The entire number of these diminutive prayer temples seem to have been placed as votive offerings in one and the same position, to the right front of the chief figure of Buddha, on the spot indicated on the plan by a double cross within a circle. Whether however this was the appropriate spot,—so far removed from the statue—for the deposit of the pilgrims offering, or whether, when once dedicated at the shrine itself, the officiating priests considered this site of sufficient proximity for absent worshippers' leavings, may be a question; but the little varying uniformity of the character and execution of the legends contained within the *chaityas* would seem to indicate that they were manufactured *on the premises*, or at all events, that the ruling hierarchy had a beneficial interest in the trade, and pos-

\* Athenæum, 5th February, 1853.

1



2



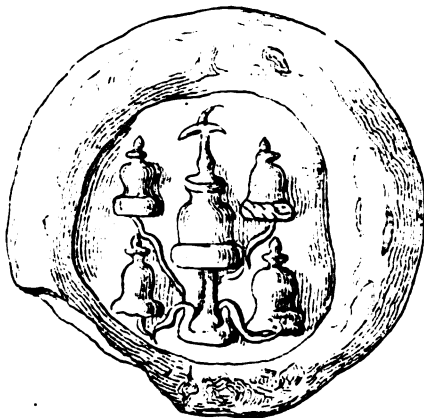
3



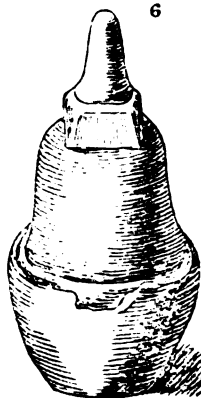
4



5



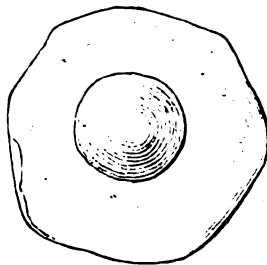
6



7



7







sibly went so far as to make the site above indicated a location for sale and delivery at an opportune pitch of devotional excitement on the part of the confiding votary! Besides the three varieties of *inclusive chaityas* there were found specimens of a more primitive form of the same manufacture in which the entire mould of clay seemed to have been prepared at one and the same operation, and after the external outline had been received. The impression was made by forcing the engraved seal into the soft clay from the base of the *chaitya*: in this case the inscription remained comparatively unprotected, but the manipulative process was more simple and possibly more assuring to the mass, who were then enabled to see the writing that was to aid their act of worship.

The inscription itself conveys the sacred formula of the Buddhists: the Indian specimens of the legend are usually faulty in their orthography. I annex a literal transcript of the favourite version at Sárnáth, merely giving Professor Wilson's authoritative declaration of its meaning, and referring the reader to the Journal of the Asiatic Society of Bengal, Vol. IV. p. 132 and p. 51, *Ariana Antiqua*.\*

The flat clay cake No. 4, afforded the purchaser an opportunity of making at a single offering a display of twenty figured chaityas and possibly in this strange religion, where water wheels now say prayers for a village community, the one expressed formula may have been supposed in its association to have twenty vehicles for its enunciation!

Figure 5 offers a more humble variety of the same species of impression, having five *chaityas* only and no inscription.

These last were found promiscuously mingled with the débris in the open court, generally at the level of the original surface, showing that their date is not later than that of the destruction of the building itself.

The Lithographed plan indicates the various places where food was

\* Sanskrit version.

ये धर्महेतु प्रभ  
वा हेतु तेषा तथा गते  
अ वदतेषा च योनि  
रोध एवं वादो मद्वा

अमलः

३ B 2

Wilson's Translation.

The Tathágata (Buddha) has declared the causes which are the origin of moral merit: what is its obstruction also the great ascetic has explained!

discovered, and I believe Major Kittoe met with the remains of ready-made wheaten cakes in the small recess in the chamber towards the N. E. angle of the square. I can myself assert that on the floor of the cell marked 3, ⊕, a large quantity of rice was found, together with portions of wheat and other grain, part of which was spread out, or possibly scattered at the moment of the destructive inroad that was brought to a climax in the conflagration of the monastery.

A native axe of the form in ordinary use to this day was discovered, imbedded in the verandah foundation at 4, ⊕.

In the cells to the eastward were found, among other things, considerable masses of brass, melted up into nodules and irregular lumps as chance gave them a receptacle amid the general ruin. Here also were seen, broken or whole, the pottery vessels of every day requirement, and the iron nails which connected the cross rafters, still fixed in the larger beams that had escaped complete combustion. Among other bits of iron-work, there remained a well-fashioned ring-bolt that might pass muster at the present day; of matters of domestic utility, I must not omit to mention a clay *chirāgh* or lamp of the pointed wick-holder description, which, though it has retained its position in that form in other parts of India, is now superseded in local use by the ordinary small circular saucers of baked clay.

The whole of the somewhat miscellaneous Sárnáth collection as yet unearthed has been deposited in the Benares College.

It remains for me to advert to the plans Nos. 2 and 3. The lithograph No. 3, is an outline section of that portion of the raised mound, situated some hundred yards to the N. W. of the monastery, on which the relic tope was placed: this it will be seen was a circular building of massive strength erected in far more modern days than the large tope previously adverted to, the relics were discovered and removed, many years ago, by some of our older residents at Benares. From the inclination of the walls now standing, it is clear that the dome was not designed to follow the ordinary outline, and that if finished at all, it must have been a flat unsightly object as compared with the lofty proportions of the earlier edifice. Major Kittoe was under the impression that the visible portion of the

~~Section 2. List of Contents~~

Nº 3.

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RE SECTION C

AND CONTINUATION

A. M

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B.B.

C. L

D. O

E. L

F. C

su

H. O

pr

I.

sc

na

me

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v 1853.



wall formed only the upper curve of a building of considerable elevation that had been covered in process of time, and he further trusted that deep digging would reward the explorer with new relics, as in the case of the Manikyala tope. In consequence of this I sunk my excavation till I came to the absolute base of the foundation.

The notes on the plan appear to explain all that need be said about the rest of the undertaking, but I may mention that I should be disposed to assign a considerably more modern date to the platform pedestals of the statues of Buddha, than to the monastery itself.

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*Examination and Analyses of Dr. CAMPBELL's Specimens of Copper ores obtained in the neighbourhood of Darjeeling.—By HENRY PRIDDINGTON, Curator Museum of Economic Geology.*

Dr. Campbell, at my request, has been good enough to send us down large despatches of twelve seers each of these ores as found, so as to enable us both to judge accurately of the nature of the rock in which they occur and to *sample* them fairly. By sampling is meant, amongst metallurgists and smelters, the taking of fair average samples from a heap of ore, so as to obtain fair results in the reduction or analysis. It is a circumstance which leads to much deception that those who forward specimens only send choice ones, and the assayers again too often neglect this process of careful sampling which is a tedious one and requires judgment and great care.

I.—*Pushak Ore.*

This ore, as sent, may be described as a tough, generally fine-grained, and slightly contorted hornblende slate; passing into a massive hornblende rock; the copper and iron pyrites being dispersed through it, or sometimes in laminæ, like the mica in gneiss. Generally the whole may be called a pyritous hornblende slate.

There are also a few specimens of copper and iron pyrites in a hard quartzose micaceous rock intersected by thicker laminæ of hornblende. This rock I should, call a tough, pyritous, hornblendic mica slate.

There are also a few specimens of contorted mica schist with a little pyrites.

A careful sample of all these ores gave in 1,000 grains.

	Grains.	
Earthy Silicates, . . . . .	856.00	
Per. Ox. Iron, . . . . .	113.00	
Bismuth, . . . . .	7.00	
Protox. Copper, . . . . .	17.12	Copper.
		13.57
	<hr/>	
	993.12	
Loss (principally Sulphur), . . . . .	6.88	
	<hr/>	
	1000.00	
	<hr/>	

Hence the pyrites are found be principally iron pyrites with but a small per centage (of  $1\frac{1}{2}$  per cent.) of copper.

It will be observed that my analysis is one of the whole rock. No doubt far better results would be obtained by pounding and washing, but this would be a very expensive process with so tough a rock, and require the care of experienced miners, for I found that much of the pyrites had a tendency to "*wash off*," as it called, from the extreme fineness to which the scales of it are reduced in the mortar and exist in their natural state.

Altogether then, unless richer ores are found, this is not one worth working; but it may be well worth sinking a shaft (common native well-sinkers will go to a good depth in a dry soil) to see what lies below. No surface indication, rich or poor, should be taken as an index to what a mineral scite really is.

## II.—*Mungwah Ores.*

This ore is mostly, or rather wholly, Actinolite rock, white, grey and yellow brown. The dark grey specimens approach to a micaceous hornblende rock and the lighter and white ones are Tremolite; all varieties of hornblende. The rock contains every where specks and nests of pyrites, and in some specimens minute nests of magnetic iron ore. 1,000 grains of this rock, from about a pound of it carefully

sampled, gave nothing but iron, and traces only of copper, just sufficient to colour the ammoniacal solution.

### III.—*Punkabarri Ores.*

A compact and tough, massive, and fibrous hornblende rock; with promising nests of pyrites (as to size) interspersed, but on examination it was found to be exactly the same as the foregoing No. II. affording a mere trace of copper only.

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### A Monograph of the Indian species of *PHYLLOSCOPUS* and its immediate affines.—By EDWARD BLYTH.

There is no group of birds more difficult to the student of Indian Ornithology, than the very extensive series of small *Bee-fins*, or "Warblers," known to the French as *Pouillots*, and in parts of England by the name of *Pettychaps*. It is exemplified in Europe by four well known species;\* and as an *avis rarissima* in Europe, the common Indian *Motacilla proregulus*, Pallas (*Regulus modestus*, Gould), which strictly appertains to the series under review, has

\* 1. *PHYLLOSCOPUS SIBILATRIX*; *Motacilla sibilatrix*, L.: *Sylvia sylvicola*, Latham. Type of *SIBILATRIX*. Kaup.

2. *PH. BONELLI*; *Sylvia Bonelli*, Vieillot: *S. Nattereri*, Temminck.

3. *PH. TROCHILUS*; *Motacilla trochilus*, L.: *Sylvia fltis*, Bechstein: also, according to M. Degland, *S. icterina*, Temminck (nec Vieillot); *S. flaviventris*, Vieillot; *S. angusticauda*, Gerbe; and *S. tamarixis*, Crespigny.

4. *PH. RUFUS*: *Curruca rufa*, Brisson: *Sylvia collybita*, Vieillot; *S. loquax*, Herbert; and by the older British ornithologists erroneously assigned to *Motacilla hippolaïs*, L.

In addition to these four, in N. Africa, Dr. Rüppell describes—

*PH. UMBROVIRENS*; *Sylvia umbrovirens*, Rüppell (described but not figured in his *Neuen Wirbelthieren*, Vogel, p. 112). From Abyssinia.

*PH. BREVICAUDATUS*; *Sylvia brevicaudata*, Rüppell, *Atlas*, t. 35. From Kordofan.

Another that will probably have to be added to the European fauna is

*PH. BREVIROSTRIS*; *Sylvia brevirostris*, Strickland, *P. Z. S.* 1836, p. 98. Procured at Smyrna. Differs from *PH. RUFUS* in its greater size, and from *PH. TROCHILUS* "in the shortness of the beak, and the dark colour of the legs."

Lastly, two species are briefly described in Dr. Horsfield's Catalogue of Javanese birds, *Trans. Lin. Soc.* xiii. 156; neither of which can we identify with Indian species: viz.



been obtained in Dalmatia and in Britain; while three of the European species have been stated to occur in India, but at a time when the various Indian *Pouillots* were undescribed and the multiplicity of distinct species of them was unsuspected. As neither of them, however, would appear to have been met with in the country since the numerous Indian species have been recognised, we are led to infer that certain other species were mistaken for them; and it is highly probable that the *Sylvia sibilatrix* of Dr. Royle's list\* refers to our PH. NITIDUS, and Mr. Gould's *S. trochilus* of W. India† to our PH. VIRIDANUS; and perhaps M. Temminck's *S. trochilus* of Japan may likewise prove to refer to some nearly affined species, which he failed to distinguish from the *trochilus* of Europe.‡

The Indian species have been described under various generic names; and even now it would not appear that systematists are agreed whether to range the accepted typical form, that of *Motacilla trochilus*, L., under PHYLLOPNEUSTE of Meyer (1822), which included also the distinct form of *Mot. hippolais*, L., regarded

PH. JAVANICUS; *Sylvia javanica*, Horsfield: seemingly affined to our PH. MAGNIROSTRIS. And

PH. MONTANUS; *Sylvia montana*, Horsfield: apparently affined to our PH. TRISTIS. Of PH. MONTANUS, (Horsf.), the late lamented Hugh E. Strickland informed us, that "the wing is 2 in. long, gradated, with the fifth quill longest."

Mr. Strickland adds, from Java,—

PH. TRIVIRGATUS; *Sylvia trivirgata*, Temminck: a species referable to Mr. Hodgson's Group ABERCENIS; and it is probable that others of this minor group, from the Archipelago, remain to be described.

\* *Ill. Him. Bot. Introd.* p. lxxvii. In this list are enumerated "SYLVIA SIBILATRIX, S. RUFA (plains), S. TROCHILUS, and several species undetermined." It is not probable that either of the names specified is correctly applied; nor certain others in the same list, as especially GALLUS SONNERATII!

† *Proc. Zool. Soc.* 1805, p. 90.

‡ Some Japanese birds which we saw with Mr. Gould, sent by M. Temminck, and identified by him with European species, certainly presented differences more or less marked. We especially remember the Japanese Robin, Jay, and Bullfinch. The last is probably PYRRHULA GRISEIVENTRIS, Lafresnaye, *Rev. Zool. de la Soc. Cuv.* 1841, p. 241.—Since this note was penned, we have seen Mr. Gould's figure of the Japanese Bullfinch, in his 'Birds of Asia,' where it is designated P. ORIENTALIS, Temminck and Schlegel. The Jay, too, is cited by the Prince of Canino as GARRULUS JAPONICUS.

by Mr. G. R. Gray (in 1841) as typical of *PHYLLOPNEUSTE*,—or in *PHYLLOSCOPUS*, Boie (1826), of which *M. trochilus* is cited as typical. In M. Degland's 'Ornithologie Européenne' (1849), *M. hippolais*, L., with three European congeners is referred to *HIPPOLAIS*, Brehm (1828), the typical species being termed *H. POLYGLOTTA*, (Vieillot); and *M. trochilus* and its congeners are assigned to *PHYLLOPNEUSTE*. An older name than *HIPPOLAIS*, Brehm, occurs, however, in *FICEDULA*, Koch (1816), which is adopted by Dr. Rüppell for the *Pouillots*,\* and by Dr. Schlegel for both groups;† but it is faulty as implying these birds to be fig-eaters (or *Beccaficos*), whereas all of the series are exclusively insectivorous, and in no way to be confounded with the highly frugivorous Fauvettes.‡

In former papers, we followed Mr. Gray's arrangement, but with this error, that certain Indian species were assigned to *PHYLLOPNEUSTE* apud Gray (v. *HIPPOLAIS*, Brehm); whereas upon referring to the characters of this genus, as specified by M. Degland, we find that we had misapprehended it, and incline now to suspect that with it should be united the divisions *CULICIPETA*, nobis, and *ABORNIS*, Hodgson.

In a series of 22 species actually before us, excluding *REGULUS*, we observe that one only, the European *PHYLLOSCOPUS SIBILATRIX* (type of *SIBILATRIX*, Kaup), is remarkable for the comparative great length of its wings; whereof the first primary is minute and the second is nearly as long as the third. In all the rest, the small first primary is considerably less diminutive, and the second is much shorter than the third: the proportions varying, however, to some extent, and the wing being more or less rounded in different

\* *Systematische uebersicht der vogel nord-ost Afrika's* (1845), p. 57.

† *Revue Critique des Oiseaux d'Europe* (1844), pp. xxv.-vi.

‡ The four European species described by M. Degland under *HIPPOLAIS* are as follow:—

1. *H. POLYGLOTTA*; *Motacilla hippolais*, L.; *Sylvia polyglotta*, Vieillot: *H. salicaria*, Bonap.
2. *H. ICTERINA*; *Sylvia icterina*, Vieillot (nec Temminck): *S. hippolais* apud Temminck, *Manuel*, 2nd edit., (1820).
3. *H. OLIVETORUM*; *Sylvia olivetorum*, Strickland.
4. *H. ELAICA*; *Salicaria elaica*, Liudermayer: *Ficedula ambigua*, Schlegel.

species; affording a good differential character in several instances. In general, the wings are shorter and more rounded than in the European PH. TROCHILUS: but looking to the *ensemble* of characters, it seems doubtful whether more than three divisions can be retained in the whole series under review. These are PHYLLOSCOPUS, certain species of which (constituting the *Reguloides*, nobis,)\* offer a close approximation to REGULUS, and serve to indicate the true systematic position of that genus,—REGULUS (which M. Degland and others have arranged near PARUS),—and CULICIPETA (including ABROBNIS), which should perhaps be merged in PHYLLOPNEUSTE (v. HIPPOLAIS). Under these three groups only, we now comprise the following Indian species.

I.—Genus PHYLLOSCOPUS, Boie, apud G. R. Gray. Type MOTACILLA TROCHILUS, L.†

1. PH. RAMA; *Sylvia rama*, Sykes, *P. Z. S.* 1832, p. 89. There appear to be two races of this bird, differing a little in shade of colour, but in no other particular that we can discern. The bill is rather thicker and the form less slender than in most others of the genus; and together with the colouring, approximate it to CALAMOHERPE, Boie, for a species of which it might be mistaken at first sight;‡ but the form of the wings and tail, and general character, sufficiently indicate its true position to be as here arranged.

\* *J. A. S.* XVI, 442.

† A better *average* type exists in PH. RUFUS, v. *Curruca rufa*, Brisson.

‡ We have three Indian species of CALAMOHERPE, all distinct from those of Europe.

1. C. BRUNNESCENS; *Agrobates brunnescens*, Jerdon. Very like the European C. ARUNDINACEUS (*Turdus arundinaceus*, L.; *Sylvia turdoides*, Meyer); but easily distinguished by the form of the wing, in which the second or first developed primary is constantly  $\frac{1}{2}$  in. shorter than the next, and the third, fourth, and fifth are subequal.

2. C. DUMETORUM, nobis, *J. A. S.* XVIII, 815.

3. C. AGRICOLA, Jerdon, *Madr. Journ.* XIII, pt. II, p. 131; *J. A. S.* XIV, 595. This much resembles the European C. SALICARIA (*Motacilla salicaria*, Gmelin; *C. alnorum*, Brehm, *Mot. arundinacea*, Lightfoot); but is readily distinguished from it, as is also C. DUMETORUM, by the same difference in the proportion of the primaries as exists in the species before cited.

The three Indian species of CALAMOHERPE accordingly tend to approximate PHYLLOSCOPUS in the form of the wing, and they have also less aquatic habits than their European congeners.

Length 5 in., by  $7\frac{1}{2}$  in. in alar expanse: wing  $2\frac{3}{4}$  to  $2\frac{1}{2}$  in.; 1st primary  $\frac{2}{8}$  in., the second  $\frac{1}{8}$  in. shorter than the third, which about equals the 4th and 5th: tail  $2\frac{1}{2}$  in.; its outermost feather  $\frac{1}{8}$  in. shorter: bill to gape  $\frac{3}{8}$  in.: tarse  $\frac{3}{4}$  in. Irides dark. Bill dusky above, light carneous below: legs light brown, tinged with plumbeous on the joints. Plumage, above uniform light greyish-brown; below pale or albescent, passing to white on the chin, middle of belly and vent: lores, continued as a slight streak passing over the eye, and the orbital feathers, pale.

This bird is very common in Lower Bengal during the cold season, upon sandy soil above the tideway of the rivers; haunting baubul topes and scattered trees near villages, as well as hedges and bush-jungle. Those of S. India have a slight ferruginous tint throughout; but we can detect no further difference. It would not appear to inhabit the sub-Himalayan region.

2. PH. MAGNIROSTRIS, nobis, *J. A. S.* XII, 966: *Phyllopneuste indica*, nobis, *J. A. S.* XIV, 593: *Ph. trochilus*? apud Hodgson, Gray, *Zool. Misc.* 1844, p. 82.

Length 5 to  $5\frac{1}{2}$  in., by  $8\frac{1}{2}$  in. across: wing  $2\frac{3}{4}$  to  $2\frac{1}{2}$  in., its first primary measuring  $\frac{3}{8}$  in., and the second being  $\frac{1}{8}$  in. shorter than the third, which does not quite equal the 4th and 5th: tail 2 to  $2\frac{1}{2}$  in., its two outer feathers on each side very slightly graduating: bill to gape  $\frac{3}{8}$  in.: tarse  $\frac{3}{4}$  in. Irides dusky. Bill dusky plumbeous above, fleshy horn-colour at base of lower mandible. Legs albescent plumbeous. Plumage, duskyish or infuscated olive-green above, having a faint tinge of tawny, especially on the wings and tail; the medial larger coverts of the wings being tipped with albescent-greenish: a narrow but conspicuous pale yellowish supercilium, and the lower ear-coverts are partly of the same hue: under-parts pale; the breast tinged with ashy, mingled with faint yellowish; and the rest of the lower-parts are more or less of a purer yellowish-white. The tawnyish hue of the wings and tail resembles that of the upper-parts of the European PH. EURUS, whence the name of the latter species.

The species appears to be generally diffused over the country, and we have seen specimens from the eastern coast of the Bay of Bengal, and also one from Chusan. We have been informed that it has a pleasing song.

3. *PH. LUGUBRIS*, nobis, *J. A. S.* XII, 968. Length  $4\frac{1}{2}$  to  $4\frac{3}{4}$  in., by  $7\frac{1}{2}$  in. across: wing  $2\frac{1}{2}$  in.; first primary  $\frac{3}{4}$  to  $1\frac{1}{8}$  in., and the 2nd  $\frac{5}{16}$  in. shorter than the third, which does not quite equal the 4th and 5th: tail  $1\frac{1}{2}$  in., subeven. Bill to gape nearly  $\frac{1}{2}$  in. Tarse  $\frac{3}{4}$  in. Irides dusky. Bill dusky above, and also on the medial part of the lower mandible; the rest amber-coloured. Legs pale greenish-dusky. Plumage, above dusky olive-green, nearly as in the last species, but without the tawny shade; also a similar pale yellowish supercilium, and tips to the medial wing-coverts: below albescent, faintly tinged with yellow medially, and laterally with the hue of the flanks.

Common in Lower Bengal during the cold season, and more or less so over the country generally.

4. *PH. AFFINIS*; *Motacilla affinis*, Tickell, *J. A. S.* II, 576: *Ph. flaveolus*, nobis, *passim*; *Abrornis xanthogaster*, Hodgson, Gray, *Zool. Misc.* 1844, p. 82. Length  $4\frac{3}{8}$  to  $4\frac{1}{2}$  in., by  $6\frac{1}{2}$  to 7 in. in expanse: wing  $2\frac{1}{2}$  to  $2\frac{3}{4}$  in.; having the 1st primary  $\frac{3}{4}$  in., and the second  $\frac{5}{16}$  in. shorter than the third, which almost equals the 4th and 5th: tail  $1\frac{1}{4}$  to  $1\frac{1}{2}$  in., its outermost and penultimate feathers very slightly graduating: bill to gape  $\frac{1}{2}$  in., or a trifle more: tarse  $\frac{3}{4}$  in., or nearly so. Irides dark. Bill dusky above, amber-coloured below: legs pale brownish-dusky, tinged with yellow; the soles more or less yellowish. Plumage, above fuscous olive-green, with an extremely faint tawny tinge; no pale tips to the medial wing-coverts: supercilia, cheeks and under parts, pale sullied yellow, brightest on the middle of the belly, with a slight tawny tinge in some, and the breast and flanks a little infuscated.

This species might be supposed to be the young of the preceding, in corresponding yellowish garb to the young of *PH. TROCHILUS* and *PH. RUFUS*; but on minute comparison of freshly killed specimens, they are seen to be distinct. The bill is more feeble, and much more compressed, in *PH. AFFINIS*; whereas in *PH. LUGUBRIS* it is very little compressed, and the rictal setæ are considerably more developed. The colour of the legs is also very different, being in *LUGUBRIS* pale greenish-dusky, while in *AFFINIS* there is a strong tinge of brown. From examination of a great number of specimens, we feel convinced that the colouring here described is permanent.

The species is common in Lower Bengal, more so above the tideway of the rivers, and we believe that it is generally distributed over India.

5. *PH. INDICUS*; *Sylvia indica*, Jerdon, *Madr. Journ.* XI, 6: *Ph. griseolus*, nobis, *J. A. S.* XVI, 443.

Length  $5\frac{1}{4}$  in., by  $7\frac{1}{4}$  in.: wing  $2\frac{3}{4}$  in.; having the first primary  $\frac{7}{8}$  in. long, and the second  $\frac{3}{4}$  in. shorter than the third, which equals the sixth, and is scarcely shorter than the fourth and fifth: tail 2 in.: bill to gape  $\frac{1}{8}$  in.: tarse  $\frac{3}{4}$  in. Irides very dark brown. Bill dusky above, below pale amber: interior of the mouth whitish, with scarcely a tinge of yellow. Tarse externally and the toes above, light brown; internally and beneath, yellow. Plumage, above uniform dull ash-colour, without a tinge of green: supercilia, clear pale yellow: lower-parts pale dull yellowish, purer on the middle of the belly, and the rest more or less tinged with dull tawny.

This species appears to be found chiefly in the peninsula of India, and is rare in Lower Bengal.

6. *PH. FUSCATUS*, nobis, *J. A. S.* XI, 113: *Ph. brunneus*, nobis, *J. A. S.* XIV, 591, (the young).

Length 5 to  $5\frac{1}{4}$  in. by  $7\frac{1}{4}$  to  $7\frac{3}{4}$  in.: wing  $2\frac{1}{4}$  to  $2\frac{3}{4}$  in.; having the first primary  $\frac{1}{2}$  to  $\frac{5}{8}$  in., and the second  $\frac{1}{8}$  in. shorter than the third, which equals the 6th and is a little shorter than the 4th and 5th: tail  $2\frac{1}{4}$  in., with its outermost feathers  $\frac{3}{8}$  in. shorter than the middle ones: bill to gape nearly  $\frac{1}{2}$  in.: tarse  $\frac{3}{4}$  in. Irides dark hazel. Bill dusky above, yellowish at base of lower mandible; inside of the mouth rather pale yellow: legs greenish-brown. Plumage, above uniform olive-brown; below albescent, purest on the throat and middle of belly, and weakly tinged with a ferruginous or ruddy hue on the pale supercilia, sides of neck, flanks and lower tail-coverts, and more faintly on the breast; axillaries also weak ferruginous, with the fore-part of the under-surface of the wing; and the primaries are slightly margined with pale rufescent: no trace whatever of a wing-band. The young (*Ph. brunneus*, nobis, *passim*.) resemble the adults in colour, but the wings and tail are rather shorter, and the plumage is of somewhat more open texture.

Not rare in Lower Bengal during the cold season; but commoner, it would seem, to the eastward, and especially in Arakan.

7. PH. VIRIDANUS, nobis, J. A. S. XII, 967 :\* *Abrornis tenuiceps*, Hodgson, Gray, *Zool. Misc.* 1844, p. 83. (Perhaps PH. TROCHILUS of W. India apud Gould).

Length  $4\frac{1}{2}$  to  $5\frac{1}{2}$  in., by  $7\frac{1}{2}$  to  $7\frac{1}{2}$  in. : wing  $2\frac{1}{2}$  to  $2\frac{1}{2}$  in. ; its first primary  $\frac{5}{8}$  to  $\frac{3}{4}$  in., and the second  $\frac{1}{2}$  in. shorter than the third, which equals the fourth and fifth : tail  $1\frac{1}{2}$  to 2 in. Bill to gape nearly  $\frac{3}{4}$  in. : tarse  $\frac{1}{2}$  to  $\frac{3}{4}$  in. Irides dusky. Bill dusky horn-colour above, the under mandible yellowish except towards tip. Legs pale greenish-plumbeous. Plumage, above light dull olive-green, beneath greenish-albescent : a pale yellow streak over the eye ; and a slight whitish bar on the wing, formed by the tips of its larger coverts.

The commonest species of the genus in Lower Bengal ; and we believe generally diffused. The only sound we have heard it utter is a faint *tiss-yip* frequently repeated ; but never a number of times in continuous succession, like the much louder *tsih-tseh* of the European PH. RUFUS.

8. PH. NITIDUS, nobis, J. A. S. XII, 965 : *Muscicapa nitida* (?), Latham, Franklin : *Sylvia hippolais* apud Jerdon, *Madr. Journ.* XI, 6 ; *Hippolais Swainsoni*, Hodgson, Gray, *Zool. Misc.* 1844, p. 82. (Probably *Sylvia sibilatrix* of Royle's list.)

Length  $4\frac{1}{2}$  to  $4\frac{1}{2}$  in., by  $7\frac{1}{2}$  to  $7\frac{1}{2}$  in. across : wing  $2\frac{3}{4}$  to  $2\frac{3}{4}$  in. ; having the first primary  $\frac{2}{3}$  to  $\frac{5}{8}$  in., and the second  $\frac{3}{8}$  in. shorter than the third, which equals the fourth and exceeds the fifth : tail  $1\frac{1}{2}$  to 2 in. : bill to gape  $\frac{3}{4}$  in. ; and tarse  $\frac{3}{4}$  in. Irides dark. Bill carneous-dusky, the lower mandible pale ; and legs light brownish, tinged with yellow on the toes. Plumage, above of a much livelier green than in any of the preceding, resembling that of the European PH. SIBILATRIX ; below unsullied pale yellowish, brightest about the breast ; and there is a pale wing-band, formed by the tips of the larger coverts of the secondaries.

This pretty species appears to be very generally distributed, but is somewhat rare in Lower Bengal.

9. PH. TRISTIS, nobis, J. A. S. XII, 966 : *Sylvia trochilus* apud Jerdon, *Madr. Journ.* XI, 6.

\* *Phyllopneste rufa* apud nos, J. A. S. XI, 191 ; and *Ph. affinis*, *Ann. Mag. N. H.* 1843, pt. 2, p.

Length  $4\frac{1}{2}$  to 5 in.,  $6\frac{1}{2}$  to  $6\frac{3}{4}$  in.; of wing  $2\frac{1}{2}$  to  $2\frac{3}{4}$  in.; the first primary  $\frac{3}{4}$  in. (in large specimens), and the second  $\frac{1}{4}$  in. shorter than the third, which equals the fourth and fifth: tail  $1\frac{3}{4}$  to 2 in.: bill to gape  $\frac{1}{2}$  in.; and tarse  $\frac{2}{3}$  to  $\frac{1}{2}$  in. Irides dark. Bill blackish, tinged with yellow at base of lower mandible; and gape also yellow: legs dull black. Plumage, above uniform dull brown: below albescent, with a faint tinge of ruddy or ferruginous on the pale supercilia, sides of neck, breast and flanks; and no tinge of yellow except on the axillaries and fore-part of the wing underneath, which are almost pure light yellow. Bill small and slender.

A common species, and generally diffused. We once observed it in great abundance, together with *CALAMOPHRE AGRICOLA*, haunting low bushes near the Calcutta salt-water lake.

10. *PH. OCCIPITALIS*; *Phyllopneuste occipitalis*, Jerdon, nobis, J. A. S. XIV, 593.

Length  $4\frac{1}{2}$  in.: of wing  $2\frac{3}{4}$  in.; the first primary  $\frac{3}{4}$  in., and the second  $\frac{5}{8}$  in. shorter than the third, which nearly or quite equals the fourth and fifth: tail 2 in., even or squared. Bill to gape  $\frac{3}{8}$  in. Tarse  $\frac{1}{2}$  in. Alar and caudal feathers unusually firm. Bill light dusky above, pale below: legs pale. Plumage, above mingled green and ashy, the latter prevailing on the back, the former on the rump, wings and tail; crown dusky, with whitish supercilia, and a conspicuous pale medial line, broader and tinged with yellow at the occiput: a slight but distinct yellowish-albescent wing-band; the fore-part of the wing brightish green; and its margin, with the axillaries, pure light yellow. Lower-parts albescent, mingled with yellowish, and very faintly tinged with ruddy. Inner webs of the three outer tail feathers on each side narrowly bordered with white, the ante-penultimate less so.

This pretty species we have only seen from the Deyra Doon and from S. India. In colouring, it approximates the groups *Reguloides* and *Abrornis*; but the remarkable firmness of its wings and tail is peculiar, and prohibitive of its association with either.

The next three species (constituting the subgroup *Reguloides*, nobis,) have, like the last, a pale medial streak on the crown, and they greatly approximate the genus *REGULUS* in figure and proportions, and even in colouring (minus the developed crest); but their habits are those of other *PHYLLOSCOPI*.



11. PH. TROCHILOIDES; *Acanthiza trochiloides*, Sundevall (1837): *Phyllopneuste reguloides*, nobis, *J. A. S.* XI, 191, XII, '963 (nec *reguloides* apud Hodgson).

Length of a male  $4\frac{1}{2}$  in., by  $7\frac{1}{4}$  in.: wing  $2\frac{1}{2}$  in.; its first primary  $\frac{1}{8}$  in., and the second  $\frac{3}{8}$  in. shorter than the third, which equals the fifth and is a little shorter than the fourth; but, in some, these three are equal: tail  $1\frac{1}{2}$  in., even. Bill to gape  $\frac{4}{5}$  in., or nearly so. Tarse  $\frac{1}{4}$  in. Length of a female  $4\frac{1}{2}$  by  $6\frac{3}{4}$  in.; wing  $2\frac{3}{8}$  in.; and tail  $1\frac{1}{2}$  in. Irides dark. Upper mandible dusky, the lower yellow; and legs yellowish-brown tinged with plumbeous. Plumage, above dull green, a little infuscated, with two conspicuous yellowish-white bars on the wing, formed by the tips of the greater and lesser coverts: below albescent-greenish, a little tinged with yellow: a broad yellowish-white or pale yellow supercilium; and above this a broad dusky band, leaving the middle line of the crown dull green like the back, but paling at the occiput; below the supercilium the colour is also dusky: axillaries, with the fore-part of the wing underneath, yellow; and the outermost and penultimate tail-feathers have a narrow whitish margin to their inner web.

Inhabits the sub-Himalayas, and visits Lower Bengal in some abundance during the cold season. We have obtained one so late as March 15th in the vicinity of Calcutta.

12. PH. PROREGULUS; *Motacilla proregulus*, Pallas: *Regulus modestus*, Gould; and, in abraded plumage, *R. inornatus*, nobis, *J. A. S.* XI, 19, and *Ph. montanus*, Hutton, nobis, *Catal.* No. 1105: *Phyllopneuste nitidus*, Hodgson, G. R. Gray.

Length generally about  $4\frac{1}{2}$  to  $4\frac{3}{4}$  in., by 6 to  $6\frac{1}{2}$  in. across: wing  $2\frac{1}{2}$  in.; its first primary  $\frac{1}{2}$  in.,\* and the second not  $\frac{5}{8}$  in. shorter than the third, which exceeds the sixth, and nearly or quite (in different specimens) equals the fourth and fifth: tail  $1\frac{1}{2}$  to  $1\frac{3}{4}$  in., even. An unusually large specimen measured  $4\frac{1}{2}$  by 7 in.; wing  $2\frac{1}{4}$  in.: tail  $1\frac{1}{2}$  in. Bill to gape nearly  $\frac{3}{4}$  in.: tarse  $\frac{1}{4}$  in. Irides dark, Upper mandible dusky, the lower yellow except at tip; and legs rather pale brown, without any plumbeous tinge. Bill nearly as much compressed as in *REGULUS*. Plumage, above olive-green, brightest on the rump, wings and tail: crown dusky, with a pale mesial line,

\* In one only, of several specimens,  $\frac{5}{8}$  in.

sometimes well defined, but in new plumage not very distinct; and in much worn or abraded plumage, it often disappears altogether, and the upper-parts are then dingy greyish-brown, with scarcely a tinge of green: two conspicuous yellowish-white bars on the wing, the hinder more broad; and behind this is a dark patch, corresponding to the black seen in *REGULUS*: tertiaries conspicuously margined with whitish (as more or less in *REGULUS*), and secondaries and some of the primaries slightly tipped with the same: axillaries, with the fore-part of the wing underneath, pale yellow: supercilia and lower-parts greenish-albescent.

Common in Lower Bengal, where a few perhaps breed; but the great majority retire to the mountains for that purpose.\* As an exceedingly great rarity, it has been met with in Dalmatia and in England. Habits as in other species of *PHYLLOSCOPUS*, and not (as in *REGULUS*) gregarious: song-note nearly similar to that of *PH. SIBILATRIX*, but considerably weaker.

13. *PH. CHLORONOTUS*; *Abrornis chloronotus*, Hodgson, Gray's *Zool. Misc.* p. 82; G. B. Gray, 'Appendix to Catalogue of specimens presented by Mr. Hodgson to the British Museum,' p. 152; v. *Regulus modestus* apud Hodgson.

Resembles the last, but is smaller, with bill conspicuously shorter and darker-coloured, and the rump pale canary-yellow, strongly contrasting with the hue of the back; the median coronal line much more conspicuous, and the pale margins of the tertiaries less so. Its size is that of the European *REGULUS CRISTATUS*.

Length  $3\frac{1}{2}$  in., or a trifle more: wing  $1\frac{1}{2}$  to 2 in.; its first primary  $\frac{1}{8}$  in., the second  $\frac{1}{4}$  in. shorter than the third, which does not equal the fourth and fifth. Bill to gape about  $\frac{1}{2}$  in., and tarse  $\frac{3}{4}$  in.: tail  $1\frac{1}{2}$  in. to  $1\frac{3}{4}$  in. Upper mandible blackish, the lower pale except towards tip. Legs pale. In other respects like the last, from which it is at once distinguished by its pale pure yellow rump.

This minute species appears to be peculiar to the sub-Himalayan region, where extensively distributed.

Genus *REGULUS*, (antiq.,) Cuvier.

Capt. Hutton states that both *R. IGNICAPILLUS* and *R. CRISTA-*

\* A reputed nest, taken near Calcutta, is described *J. A. S.* XII, note to p. 965.

tus of Europe inhabit the N. W. Himalaya. We have seen only a single male specimen, procured by Capt. Thomas at Simla; and this perfectly resembles *R. CRISTATUS*, except in being considerably larger, and the fine flame-coloured interior crest would seem to be more developed. Length of wing  $2\frac{3}{4}$  in., and of tail  $1\frac{3}{4}$  in. In several British specimens of *R. CRISTATUS*, the corresponding measurements are 2 in., and  $1\frac{3}{4}$  in., with the rest in proportion. Should this difference in size prove constant, the race might be denominated *R. HIMALAYENSIS*; requiring, however, to be first minutely compared with the N. American *R. SATRAPA*, Lichtenstein (v. *tricolor*, Jardine). Mr. Hodgson would not appear to have met with a true *REGULUS* in Nepal.

Genus *CULICIPETA*, nobis, *J. A. S.* XII, 963.

"General structure of *PHYLLOSCOPUS*, but having a narrow Fly-catcher's bill and armature of rictus, the ridge of the upper mandible angulated, and the breadth of the bill evenly attenuating." Such are the characters of the first or typical species, to which may be added that the claws, especially that of the hind-toe, are longer and less curved. In other species, however, the form grades to that of *PHYLLOSCOPUS*; but there is a general and marked resemblance of colouring throughout the series, indicative of their unity as a group, and which would help to separate it from the European type *PHYLLOPNEUSTE* (v. *Hippolais*). In general, the upper-parts are green, the lower bright yellow wholly or in part, and the crown exhibits the colouring (variously modified) of *PHYLLOSCOPUS OCCIDENTALIS* and of the subgroup *REGULOIDES*; while the two or three outer tail-feathers are, in most of the species, largely marked with white on the inner web. Their habits appear to be quite similar to those of the *PHYLLOSCOPI*.

1. *C. BURKII*; *Sylvia Burkii*, Burton, *P. Z. S.* 1835, p. 153: *Acanthiza arrogans*, Sundevall (1837); *Cryptolopha auricapilla*, Swainson, 2 $\frac{1}{2}$  Centen. (1837); *Muscicapa bilineata*, Lesson, *Rev. Zool. de la Soc. Cuv.* 1839, p. 104.

Length  $4\frac{3}{4}$  by  $6\frac{1}{2}$  in.: wing  $2\frac{1}{2}$  in.; its first primary  $\frac{1}{2}$  in., and the second  $\frac{1}{2}$  in. shorter than the third, which equals the sixth or seventh (in different specimens), and is rather shorter than the intervening two or three: tail  $1\frac{1}{2}$  in.: bill to gape exceeding  $\frac{1}{2}$  in.;

and tarse  $\frac{1}{2}$  in. Irides dark. Bill dusky above; underneath, with the legs, pale amber or brownish-yellow, darker on toes. Plumage, above bright yellowish olive-green; below full siskin-yellow throughout; the cheeks and sides of neck intermediate: over each eye a broad black streak reaching to the occiput, leaving the middle of the head greenish, slightly flanked with ash-grey: tail dusky, its middle feathers margined with the hue of the back, and the inner web of the outermost white nearly throughout, as also the terminal half of that of the next. Some have a slight yellowish wing-band, which in others is barely indicated.

This pretty little bird is not uncommon in Lower Bengal during the cold season, and like the rest of its tribe retires to the sub-Himalayan region to breed. Its bill has more decidedly the Fly-catcher form than in any of the following.

2. *C. CANTATOR*; *Motacilla cantator*, Tickell, *J. A. S.* II, 576: *C. schisticeps*, Hodgson, Gray's *Zool. Misc.* 1844, p. 82; G. R. Gray, 'Appendix to Catalogue of specimens presented by Mr. Hodgson to the British Museum,' p. 153.

Length  $4\frac{1}{2}$  in., by  $6\frac{3}{4}$  in. expanse: wing  $2\frac{1}{2}$  in.; with primaries as in *C. BURELLI*: tail  $1\frac{1}{2}$  in. Bill to gape nearly  $\frac{1}{2}$  in.; and tarse  $\frac{1}{2}$  in. Irides dark. Bill light dusky above, amber-coloured below: legs light yellowish-carneous, with a leaden tinge. Plumage, bright olive-green above, yellower on the wings and tail: throat, cheeks, supercilia, lower tail-coverts, and margin of wing, bright yellow; the belly and flanks greyish-white: greater wing-coverts tipped with pale yellow, forming a slight bar on the wing: on each side of the crown a broad black band; and an intermediate narrower greenish one, becoming yellower upon the occiput: upper tertiaries very slightly margined at the tips with yellowish-white; and the tail-feathers have a narrow yellowish-white internal border.

This pretty species is rare in Lower Bengal, becoming commoner to the westward. The bill is narrower and the rectal *setæ* are less developed, while the claws (especially that of the hind-toe) are shorter and more curved, than in *C. BURELLI*.

3. *C. PULCHRA*; *Abrornis pulcher*, Hodgson, nobis, *J. A. S.* XIV, 592: *Abr. erochroa* (?), Hodgson, Gray, *Zool. Misc.* 1844, p. 82 (undescribed); G. R. Gray, Appendix to Catalogue, p. 152.

Length  $4\frac{1}{2}$  in., of wing  $2\frac{1}{2}$  in., with primaries as in C. BURKII: tail  $1\frac{1}{2}$  in.: bill to gape  $\frac{1}{2}$  in.; and tarse nearly  $\frac{1}{2}$  in. Bill dusky above, below yellow or amber-coloured; and tarse pale. Plumage, above dull olive-green, brighter on the rump and margins of the wing and tail-feathers, those of the primaries yellowish, and a pale rufescent bar across the wing: two broad black streaks on the crown, and between them a dull greenish streak flanked with ashy: supercilia also dull green; but the orbital feathers are yellow; and the entire under-parts are pale dull yellow, or albescent-yellowish, becoming of a deeper yellow on the belly and lower tail-coverts: tail having its *three* outer feathers wholly white, save the terminal half of their outer web, together with the tip of the inner web of the ante-penultimate and slightly of the penultimate.

Inhabits the Nepal and Sikim Himalaya.\*

4. C. SCHISTICEPS; *Abrornis schisticeps*, Hodgson, nobis, *J. A. S. XIV*, 592: *Phyllopneuste xanthoschistos*, Hodgson, Gray, *Zool. Misc.* 1844, p. 82 (undescribed); G. R. Gray, 'Appendix to Catalogue,' p. 151.

Length  $4\frac{1}{2}$  in.: of wing  $2\frac{1}{2}$  in., with primaries as in C. BURKII: tail  $1\frac{1}{2}$  in.: bill to gape  $\frac{1}{2}$  in.; and tarse  $\frac{1}{2}$  in. Bill dusky above, below amber-coloured; and feet apparently pale brownish-plumbeous. Plumage, above pale ashy, passing to greenish-yellow on the

\* Mr. G. R. Gray suggests that this may be the young of his *AMA. ERCHNOA*, Hodgson, which he thus describes:

"Length 5 in.; bill from gape  $\frac{1}{2}$  in.; tarse  $\frac{1}{2}$  in.: wings under  $2\frac{1}{2}$  in. Upper surface olive-green; a streak over each eye from the nostrils, under surface and lower part of back, yellowish-white, brightest on the back [rump?] and vent: wings with the tips of the greater coverts broadly margined with rufous-white: quills brownish-black, narrowly margined with yellowish-green: tail slaty-brown, margined with yellowish-green, the outer feathers principally white."

We suspect that this description merely refers to a fine specimen of C. *PULCHRA*; and may remark that the present is the only species of the series of which the Society possesses but an indifferent specimen. Of the rest, C. *CASTANOCOEPS* we have never seen; but all of the others, save four, we here describe from *recent specimens* shot near Calcutta! The four exceptions are—*PHYLLOSCOPUS OCCIDENTALIS*, and *PH. CHLORONOTUS*, and the two *CULICIPETÆ* which next follow; and to these may be added the *REGULUS*.

rump, wings and tail : below, with the cheeks and lower half of the ear-coverts, wholly bright yellow : a whitish-grey supercilium and narrow medial streak upon the crown, and two broad ill-defined lateral streaks of rather a more dusky grey than that of the back : outermost and penultimate tail-feathers only, white on their inner webs. The young have looser plumage and all the colours less intense.

This appears to be very common throughout the sub-Himalayan territories, and is likewise met with in Arakan ; but it appears never to descend from the hills. According to Capt. Hutton, it is a common species at 5000 ft. elevation, and commences building in March. The nest would appear to resemble those of *PHYLLOSCOPUS TROCHILUS* and *PH. RUFUS*. Eggs spotless white. Vide Hutton, in J. A. S. XVII, pt. II, p. 688.

5. *C. POLIOGENYS*, nobis, J. A. S. XVI, 441.

Length  $4\frac{1}{2}$  in. : of wing  $2\frac{1}{2}$  in., with the outermost primary  $\frac{3}{4}$  in. long, the second exceeding it by  $\frac{1}{8}$  in., and the third  $\frac{1}{2}$  in. shorter than the fourth, which equals the fifth and sixth : tail  $1\frac{1}{2}$  in. : bill to gape  $\frac{1}{2}$  in. ; and tarse  $\frac{3}{4}$  in. Bill dusky above, yellow or amber-coloured below. Legs pale. Plumage, above dark olive-green, slightly yellowish on rump, with a conspicuous narrow yellowish-white wing-band : crown and ear-coverts dusky-grey, with blackish coronal bands ; the chin, and feathers proceeding from the base of the lower mandible, greyish-white : rest of the lower-parts bright yellow : tail with its three outer feathers white on the inner web, as in *C. FULCHRA*.

We have only seen this well marked species from Sikim. It might be mistaken for the preceding on a very superficial view ; but besides the differences in the details of colouring, its wings are much more rounded and the bill is somewhat less compressed.

6. *C. CASTANEOCEPS* ; *Abrornis castaneiceps*, Hodgson, nobis, J. A. S. XIV, 593 ; *Abr. castaneocephs*, H., Gray, Zool. Misc. 1844, p. 82 ; G. R. Gray, 'Appendix to Catalogue,' p. 152.

"Length  $4\frac{1}{2}$  in. : wing nearly 2 in. : bill to gape above  $\frac{3}{4}$  in. : tarse  $\frac{3}{4}$  in. Upper surface olive-green : front and top of head, pale rufous-chestnut ; hind-head and nape greyish-slate. Lower part of back and abdomen bright yellow : throat white : wings and tail

brownish-black, margined with yellowish-green: greater coverts of the wings tipped with yellow, forming two bands."—G. R. Gray.

"Above vernal green: belly, vent, and croup, deep yellow. Chin to belly white, passing laterally to soft plumbeous. Top of head chesnut, bounded by black to sides. Bill and legs pale. Length 4 in.: wing  $1\frac{1}{2}$  in.: tail  $1\frac{1}{2}$  in.: bill to forehead  $\frac{3}{4}$  in.: tarse  $\frac{1}{2}$  in."—Hodgson.

Procured by Mr. Hodgson in Nepal. We have never seen a specimen.

Finally, may be noticed a Javanese species of this group.

7. *C. TRIVIRGATA*; *Sylvia trivirgata*, Temminck, Verreaux *M.S.*: *Phylloscopus trivirgatus*, Strickland, figured and described in Sir W. Jardine's 'Contributions to Ornithology,' November, 1849.

"Length 4 in.; of wing 2 in. 2 l.; middle tail-feathers 1 in. 8 l.; outermost  $1\frac{1}{2}$  in.: bill to gape 5 l.; tarse 7 l.

"In plumage, it greatly resembles the broader-billed but closely allied *C. BURKEI* of India. Middle of crown olive-yellow, which occupies the inner webs of the feathers, the outer webs being deep fuscous, nearly black, with an olive tinge, forming a broad dark stripe on each side of the crown: between this and the eye is a superciliary streak of clear yellow: a streak of fuscous passes through the eye; the cheeks, throat, and lower-parts are bright yellow, with an olive tinge; back and wings yellowish-olive: beak horn-coloured, the base of lower mandible pale; and legs brown.

"Inhabits the island of Java." Strickland.

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*A Passage in the life of Válmiki.*—By FITZ-EDWARD HALL, Esq. *M. A.*

It is a current belief, in many parts of India, that the poet Válmiki, the author of the Rámáyana, was a *thug* or strangler. This notion was probably derived from a strain put upon the following verses, which make out Válmiki to have been, originally, on his own confession, simply a robber. This extract also embraces the received account of the origin of the poet's name.

राम तन्नाममहिमा वर्ण्यते केन वा कथम् ।  
 यत्प्रभावादहं राम ब्रह्मर्षित्वमवाप्तवान् ॥  
 अहं पुरा किरातेषु किरातैः सह वर्धितः ।  
 जन्ममात्रदिजत्वं मे शूद्राचाररतः सदा ॥  
 शूद्रायां बहवः पुत्रा उत्पन्ना मेऽजितात्मनः ।  
 ततस्त्रौरैश्च सङ्गम्य चोराऽहमभवं पुरा ॥  
 धनुर्बाणधरो नित्यं जीवानामन्तकोपमः ।  
 एकदा मुनयः सप्त दृष्ट्वा महति कानने ॥  
 साक्षान्मया प्रकाशन्तो ज्वलनार्कसमप्रभाः ।  
 तानन्वधावं लोभेन तेषां सर्वपरिच्छदान् ॥  
 ग्रहीतुकामस्तत्राहं तिष्ठ तिष्ठेति चाब्रुवम् ।  
 दृष्ट्वा मां मुनयोऽपृच्छन् किमायासि दिजाधम ॥  
 अहं तानब्रुवं किञ्चिदादातुं मुनिसत्तमाः ।  
 पुत्रदारादयः सन्ति बहवो मे बुभुक्षिताः ॥  
 तेषां संरक्षणार्थाय चरामि गिरिकानने ।  
 ततो मामचुरथ्ययाः पृच्छ गत्वा कुटुम्बकम् ॥  
 यो यो मया प्रतिदिनं क्रियते पापसञ्चयः ।  
 यूयं तद्भागिनः किं वा नेति वेति पृथक् पृथक् ॥  
 वयं स्थास्यामहे यावदागमिष्यसि निश्चयम् ।  
 तथेत्युक्त्वा गृहं गत्वा मुनिभिर्यदुदीरितम् ॥  
 अपृच्छं पुत्रदारादींस्तैरुक्तोऽहं रघूत्तम ।  
 पापं तवैव तत् सर्वं वयं तु फलभागिनः ॥  
 तच्छ्रुत्वा जातनिर्वेदो विचार्य पुनरागमम् ।  
 मुनयो यत्र तिष्ठन्ति करुणापूर्णमानसाः ॥  
 मुनीनां दर्शनादेव शुद्धान्तःकरणोऽभवम् ।  
 धनुरादीन् परित्यज्य दण्डवत् पतितोऽस्म्यहम् ॥



रक्षध्वं मां मुनिश्रेष्ठा गच्छन्तं निरयायवम् ।  
 इत्यग्रे पतितं दृष्ट्वा मामूचुर्मुनिसत्तमाः ॥  
 उत्तिष्ठोत्तिष्ठ भद्रं ते सफलः ससमागमः ।  
 उपदेक्ष्यामहे तुभ्यं किञ्चित् तेनैव मोक्षसे ॥  
 परस्परं समालोच्य दुर्दृष्टोऽयं द्विजाधमः ।  
 उपेक्ष्य एव सदृत्तैस्तथापि शरणं गतः ॥  
 रक्षणीयः प्रयत्नेन मोक्षमार्गोपदेशतः ।  
 इत्युक्त्वा राम ते नाम व्यथस्ताक्षरपूर्वकम् ॥  
 एकामनसा चैव मरेति जप सर्वदा ।  
 आगच्छामः पुनर्यावत् तावदुक्तं सदा जप ॥  
 इत्युक्त्वा प्रययुः सर्वे मुनयो दिव्यदर्शनाः ।  
 अहं यथोपदिष्टं तैस्तथाकरवमञ्जसा ॥  
 जपन्नेकामनसा बाह्यं विस्मृतवानहम् ॥  
 एवं बड्ढतिथे काले गते निश्चलरूपिणः ॥  
 सर्वसङ्गविहीनस्य वल्लीकोऽभून्ममोपरि ।  
 ततो युगसहस्रान्ते ऋषयः पुनरागमन् ॥  
 मामूचुर्निष्क्रमस्वेति तच्छ्रुत्वा तूयं मुत्थितः ।  
 वल्लीकाग्निर्गतश्चाहं नीहारादिव भास्करः ॥  
 मामप्याऊर्मुनिगणा वाल्मीकिस्त्वं मुनीश्वर ।  
 वल्लीकात् सम्भवो यस्माद्वितीयं जन्म तेऽभवत् ॥  
 इत्युक्त्वा ते ययुर्दिव्यगतिं रघुकुलोत्तम ।

*Translation of the above.*

By whom, or how, O Rāma, can the greatness of thy name be rehearsed,—that name by whose power I, O Rāma, have attained the rank of a Brāhmaṇa saint? In bygone times I was bred among Kirātas, with the children of Kirātas.\* But by birth only was I

\* "By Kirātas, foresters and mountaineers are intended, the inhabitants, to the present day, of the mountains east of Hindustan" Wilson's *Viṣṇu Purāṇa*, p. 175, note 4.

a Bráhmaṇ; for I was perpetually devoted to the practices of S'údras. From S'údra women many children were born to me of unsubdued passions. And at last, having fallen in with robbers, I *myself*, of yore, became a brigand,—bearing constantly a bow and arrows, and resembling, to men, the god of death. In a great forest, on a certain occasion, I saw before me the seven Munis,\* resplendent, and glorious like fire and the sun. Through cupidity I pursued them, longing to seize their possessions; and I shouted “stop, stop.” Seeing me, the Munis asked, “Wherefore hast thou come, base Bráhmaṇ?” “To acquire something, O most excellent of Munis,” was my reply to them. “My children, my wife, and others,—many,—are starving. To save them I wander through the mountain forests.” Upon this, they, undismayed, said to me: “Go and ask your family, one by one, whether they *consent*, or not, to participate in the *guilt* of the numerous sins that are daily committed by thee. We will certainly remain *here* until you return.” Replying, ‘yes,’ I went home, and put the question propounded by the Munis, to my children, wife, and others. They replied to me, O noblest of the Rághavas, “All the sin is, *we deem*, thy own alone: we are *willing to be* sharers in the *immediate* fruit of it only.” Contrite at hearing this, I went back, thoughtful, to the place where the Munis, with hearts full of compassion, were waiting. At the very sight of them, my soul was purified. Flinging away my bow and other *weapons*, I fell prostrate, *crying*, “Save, O excellent Munis, me who am on the road to the sea of perdition.” Beholding me lying before them, the venerable Munis said to me: “Rise, rise: blessings *be* upon thee. Communion with the pious is effectual. We will instruct thee somewhat; *and* so thou shalt be saved.” Looking at each other, *they continued*: “This vile Bráhmaṇ, as being addicted to evil courses, deserves only to be shunned by the virtuous. Since, however, he has come for sanctuary, he must be diligently protected, by being taught the way of salvation.” So saying, O Ráma, *they enjoined that*, with fixed attention, *I should* unremittingly meditate, in that very place, upon thy name, its syllables being transposed, namely,

\* The name of *Muni* is applied to any divine sage. It is here used for *Rishi*, as appears from the sequel. For the various conflicting accounts of the seven *Rishi*, see Wilson's *Vishnu Purána*, p. 49, note 2.

*mará.\** "Meditate," said they, "as directed, till we come again." Having thus spoken, the divinely wise Munis departed. At once I did as *I had been* bidden by them. With concentrated mind I meditated, and lost all consciousness of things external. Above me, rigid in figure, and detached from all commerce *with the world*, there arose, after a long lapse of time, thus *employed*, an ant-hill. Subsequently, at the close of thousands of cycles, the Rishis returned. "Come out," said they to me; *and* immediately, on hearing this *command*, I stood up. And I emerged from the ant-hill, like the sun from the mist of morning.† The band of Munis then addressed me: "Great Muni, be thy name Válmíki; for thy egress from the white-ant hill (*Válmika*) has been to thee a second birth." Thus speaking, O most eminent of the race of Raghu, they proceeded on the road to heaven.‡

This narrative is to be found at S'l. 64—86 of the sixth chapter of the second book, called *Ayodhyá-kāṇḍa*, of the *Adhyátma-rámáyana*. The *Adhyátma-rámáyana* is said, by Náges'a Bhaṭṭa, in his commentary on it, to be a portion of the *Brahmāṇḍa-purāṇa*. This annotator further states, in opposition to the general opinion, that the Válmíki here spoken of is not the author of the *Rámáyana*, but a descendant of Prachetas.

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### Literary Intelligence.

Mr. Hodgson still prosecutes at Darjiling the philological researches which had reached so interesting a point on his departure for England, towards the close of 1852. Pending the receipt of a full communication which may shortly be expected from him, the following extracts from his recent letters will show the result of his investigations; "results not only decisive," says Mr. H., "of the widest assigned scope of Tartar affinities, but also of high moment in illustration of the science of language in general.

\* The Rishis considering him unworthy to repeat the name of Ráma in its ordinary form.

† During the Indian winter.

‡ This passage is alluded to by Prof. Wilson, in his *Hindu Theatre*, Vol. I. p. 313, foot-note: 2nd Ed.

Not only are all the Tartars from America to Oceania (both inclusive) demonstrated to form one family, with a clearness equal to that brought by our Bopps and Grimms to demonstrate the full scope of Indo-European affinities, but that great law of language expounded by Spinoza and Koerber in relation to Hebrew, and by Tooke in reference to English, is shown to have an universal character by its thorough and palpable bearing upon the Tartar tongues, wherein moreover it may be grasped and held fast, not as an induction but as a clear extant fact, owing to the so long retarded and yet very imperfect cultivation these tongues have obtained. And, again, the alleged grand distinction of monosyllabism and polysyllabism upon which the inunity of the Tartars has been so confidently rested, is shown to be valueless; the so-called monosyllabism being not really such, and the so called polysyllabism being mere repetition of the same or of synonymous syllables, roots and words: in other words it is syntheticism.

“So that America is linked to Tartary by the greatest and most essential characteristic of her languages. In order to reach such results, I have had to weigh every syllable and every letter of each word, and to trace each to a root, demonstrated to be such by its standing *alone* as a word. In the vast majority of words, I have obtained one or more samples of the pure monosyllabic form of the vocable, and I have thence proceeded to the polysyllables, still seeking for the radical monosyllable of every syllable of even the longest words. My media of investigation and of test have been: 1st, Comparison of the differing synonymies of a given tongue. 2nd, Comparison of the written and spoken forms of such tongues as have both. 3rd, Comparison of the ancient and modern words of given cultivated tongues, where available, as happily is the case, for me, in regard to the Deccani languages. 4th, Comparison of the dialects of a confessedly single tongue, rich in such varieties, as the Naga and Garo for instance. 5th, Comparison of the languages of the old broken and of the recent dominant tribes. 6th, Comparison of given words standing apart and of those words as they occur in composition—a medium of proof which, by the way, alone suffices to show the emptiness of the monosyllabic dogma. Happily for the furtherance of my researches, I obtained, after my return from Europe,

a fresh series of Himalayan tongues, and one of very great value as serving to add several links to the chain of affinities that else had been wanting. These new tongues are those of the broken tribes of Himalaya of which the Chepang, already published, is one. Our broken tribes are precisely analogous to those of China, Indo-China, Malaya, Polynesia and Tamulia; and the state of the languages every where reveals the same fact, that successive waves of one and (essentially) the same human tide swept over the South from the North, some reaching our India direct from Tibet, others indirect from Indo-China.'

"With reference to Indian philology only, the following are the results of my researches. 1st, That all the cultivated Tamulian tongues (in Ceylon as well as Deccan) are essentially one. 2nd, That the whole of the uncultivated Tamulian tongues (Kol, Gondi, Maler, Lerka, &c.) are essentially one. 3rd, That the above two classes are essentially but one and the same class. 4th, That that class is the Tartaric, to use its largest and general designation. 5th, That a vast number of the most indispensable vocables of the so-called Arian vernaculars of India (Hindi, Urdu, Asamese, Bengali, Uria, Mah-ratti, &c.) are thoroughly Tartar. 6th, That a very considerable number of Sanskrit vocables of the most indispensable use, are Tartar, and that not merely in their ordinary or composite, but also in their radical forms.

"So far from seeking I have rather avoided such words as belong to 5 and 6, lest I should retard the reception of my more immediate and more general results; but I have found it impossible to leave those words out of view altogether, and, though I do not anticipate ever becoming an advocate of the doctrine of Dr. Latham and Mr. Crawford, yet am I already much struck with the fact that very numerous words in my vocabularies, against which when they were compiled I wrote H. U. or S. to denote a Hindi, Urdu or Sanskrit origin, turn out upon closer investigation to be thoroughly Tartar, even when analysed and resolved into their roots, as well as when taken statu quo of speech and book."

In Jameson's Journal for April will be found a paper by Dr. Buist, on the Physical Geography of Hindustan.

Lieut. Eastwick has brought out a 2nd edition of the two first vols.

of his translation of Bopp's Comparative Grammar, but the book is still disfigured by many inaccuracies, which are noticed with some severity in the Westminister Review for July.

In the *Journal Asiatique* No. 2 (March and April) is the first part of a Sanskrit work, text and translation, called Bhoja-Prabandha, or the history of Bhoj of Malwa, not the Bhoj of the Mahábhárat, but Bhoj son of Sindhoula, who reigned about the middle of the 10th century, A. D. and whose capital was at Dhar or Dhara on the Nerbudda. Sindhoula is not mentioned in the list which Pere Tieffenthaler has given of the Malwa kings, but he, Prof. Wilson and Wilford, who had closely studied the Bhoja-Prabandha; all place Bhoj between 913 and 967.

The MS., of the completeness of which the Editor M. Pavie has doubts, is one of those taken from Bombay by M. d'Ochoa. The 1st part contains historical matter, the 2nd which is to appear in a future No. and which is much fuller, is in.

The next article is an extract from an Arabic work by Aly Ossai-biah called the History of Physicians, which is translated by M. Sanguinetti. The author was a native of Damascus and lived in the 13th century. M. deMeynard's continuation of his *Tableau Littéraire* for Transoxiana and Khorasan complete the No.

The war in Turkey can scarcely fail to leave as one of its consequences an extended taste in Europe for the study of oriental languages and literature. Alexander Chodzko, known by his grammar of the modern Persian language and other works, has published a Manual for the use of the French army under the title of 'Le Dragoman Turc', and in our own country Max Müller of Oxford has responded to the invitation of Sir Chas. Trevelyan by drawing up an elaborate essay on the 'Languages of the Seat of War in the East,' of which two copies have been sent for our library. The latter, though hurriedly written, will prove of more than temporary service; it brings together and into a small compass much valuable philological information beyond the reach of the generality of students.

PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR AUGUST, 1854.

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At a meeting of the Society held on the 2nd inst. at the usual hour,

SIR JAMES COLVILLE, Kt. President, in the Chair,

The minutes of the last month's proceedings were read and confirmed, and the accounts and vouchers for the months of March, April and May laid on the table.

Presentations were received—

1. From Capt. Thuillier, Deputy Surveyor General, a Map of the Twenty-four Pergunnahs.

2. From the Curators of the Academy of Leyden, '*Libri Exodi et Levitici secundum Arabicam Pentateuchi Samaritani Versionem*.'

3. From Maulavi Mohammad Alum Ali Khan, an Arabic MS. of the *Kámús*, in 2 Vols.

4. From Capt. Sherwill, through Capt. Thuillier, a collection of ancient Hindu copper and silver coins.

The following is an extract from Capt. Sherwill's note on these coins:

"As far as I can ascertain, they are coins of the Cheeroo Rajahs who, in olden days, ruled over Behar and that before the Moham-medan conquest. The coins were dug up at Futooha, or near to it, that is, about ten miles to the east of the city of Patna. They were twelve feet below the level of the country, and in their neighbourhood was found a flooring of very large flat bricks about two feet square."

Lt.-Col. Proby T. Cautley of the Bengal Artillery, F. R. S., F. G. S. was, pursuant to notice given at the last meeting by the Council, balloted for, and duly elected an honorary member.

Mr. W. Grapel was balloted for, and elected an ordinary member.

R. Spankie, Esq. C. S. was named for ballot at the next meeting : proposed by G. H. Freeling, Esq. and seconded by Dr. Clarke.

The Council submitted a report recommending that the offer of M. Alexander Von Kremer, Dragoman of the Austrian Consulate at Alexandria, to edit the original text of Waquidy on the Wars of Mohammad for publication in the Bibliotheca Indica, be thankfully accepted.

Ordered that the recommendation be adopted.

Communications were received—

1. From E. Thomas, Esq., a paper entitled 'Notes on the present state of the Excavations at Sarnáth.'

2. From the Assistant Secretary to the Government of the North Western Provinces, forwarding copy of a Meteorological Register kept at the Office of the Secretary to the Government N. W. P. for the month of June, 1854.

3. From Dr. Fayrer, Lucnow, enclosing a copy of Meteorological Observations kept at the Lucnow Residency, for the month of May, 1854.

4. From Bábu Rádhánáth Sikdár, enclosing abstracts of Meteorological Observations taken at the Surveyor General's Office, during the month of April last.

The Librarian submitted his usual monthly report.

The Curator of the Zoological Museum exhibited a small collection of Insects which he had received from Ceylon, and a very large Fungus (*Boletus* ?) which had been brought down from Upper Assam.

#### LIBRARY.

The library has received the following accession of books since the last meeting.

#### *Presented.*

The Kámús, an Arabic Dictionary in two volumes MS.—By MOULAVI MOHAMMAD ALAM ALI KHAN.

Libri Exodi et Levitici secundum Arabicam Pentateuchi Samaritani versionem ab Abu Saido conscriptum quos ex tribus codicibus edidit A Kuenen. Lugduni Bat. 1854, 8vo.—By THE CURATORS OF THE ACADEMY OF LEYDEN.



Natuurkundig Tijdschrift voor Nederlandsch Indië, Deel VI. aflevering III. & IV.—BY THE NATURAL HISTORY SOCIETY OF BATAVIA.

Journal Asiatique, for January, 1854.—BY THE SOCIÉTÉ ASIATIQUE.

The Oriental Christian Spectator, for July, 1854.—BY THE EDITOR.

Journal of the Indian Archipelago, for January and February, 1854.—BY THE EDITOR.

Calcutta Christian Observer, for August, 1854.—BY THE EDITORS.

The Oriental Baptist, No. 92.—BY THE EDITOR.

The Upadeshak, No. 92.—BY THE EDITOR.

The Proceedings of the Royal Society of London, for April and May 1854.—BY THE SOCIETY.

The Bibidhārtha Saṅgraha, No. 28.—BY THE EDITOR.

The Annual Report of the Tattwabodhinī Sabhā, for the Bengali year 1776.—BY THE SABHĀ'.

*Exchanged.*

The Athenæum for April, 1854.

The London, Edinburgh and Dublin Philosophical Magazine for May, 1854.

The Calcutta Review, for June, 1854.

*Purchased.*

Comptes Rendus, Nos. 14 to 17.

The Annals and Magazine of Natural History for May, 1854.

Rāghava Pāndaviya, an Epic Poem by Kavirāja Pandita with a commentary styled Kapāta-vipātika. By Premchānd Tarkavāgisa, 5 copies.

RA'JENDELA'L MITTRA.

*August 2nd, 1854.*

# JOURNAL

OF THE

## ASIATIC SOCIETY.

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No. VI.—1854.

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*A Twenty-third Memoir on the Law of Storms in the Indian and China Seas ; being the Peninsular and Oriental Steam Navigation Company's Ship PRECURSOR's Cyclone, of October, 1851.—By HENRY PIDDINGTON, President of Marine Courts.*

This Memoir furnishes us not only with a new track for the Cyclones at the Sand Heads, but, at length, an instance of the rare, though not unexpected case of the undoubted curving of a Cyclone track to the North-East in the Bay of Bengal, analogous to those which are so commonly seen in the Western hemisphere! and which we have recently shewn to occur in the China Sea.

I commence the documents with the Logs of the ships farthest to the Southward, so as to trace the Cyclone inwards from sea. The documents are followed by a tabular arrangement of them and a summary, detailing the data on which this remarkable track is laid down, and this by remarks on the various accessory phenomena and results of the investigation.

*Abridged Log of the Barque ARARAT, Capt. RITCHIE, from Mauritius to Calcutta—reduced to Civil Time.*

18th October, 1852.—The *Ararat* was at Noon in Lat. 11° 35' North ; Long. 87° 12' East, with her Barometer at 29.82 ; Ther. 87°. Steering to the north with a six knot breeze at W. S. W. ; P. M. a little squally.

19th Oct.—A. M. more settled ; but at daylight dark cloudy weather with sharp squalls, continuing to Noon when Lat. 13° 50' N. ; Long. 29° 31' E. ; Ther. 84° ; Bar. not marked ; Wind from W. S. W. to W. b. N. P. M. wind

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marked S. S. W, strong breeze and threatening weather, which increased to midnight, when wind is marked at S. b. W.; continued squalls and heavy rain.

20th Oct.—The same, but moderating a little at daylight. 10.30 A. M. violent squalls from S. W. and S. b. W. At Noon a heavy sea coming up from the N. Westward with a very heavy appearance, Lat. Acct.  $16^{\circ} 28' N.$ ; Long. Acct.  $86^{\circ} 58' E.$ ; Bar. 29.75; Ther.  $84^{\circ}$ . 1 30 P. M. rounded to; wind S. S. W. increasing gale and more squalls. Barometer gradually falling. 2 P. M. Bar. 29.67. Midnight hard gale and torrents of rain.

21st Oct.—4 A. M. bore up. Noon more moderate. Lat. Obs.  $17^{\circ} 6' N.$ ; Long.  $87^{\circ} 50' East$ ; Bar. 29.70; Ther.  $84^{\circ}$ . Wind South at 5 A. M. and S. S. W. at noon; P. M. S. S. W. to midnight. Moderate gale, ship running 7 and 8 knots to the N. b. W. but by sunset hard squalls from the southward. Midnight, hard gale and squalls; 10 knot breeze; wind about South.

22nd Oct.—3 A. M. wind South; 4 A. M. close reefed. Daylight hove to again and made all preparations for a hard blow. 10, gale increasing and squalls more severe from the south, "*A dense black bank hanging to the westward.*"\* Bar. 29.62. "At 11, a hard dry gale" with a heavy sea; Noon hard gale. Lat. Obs.  $19^{\circ} 10' N.$ ; Long. Chr.  $88^{\circ} 2' E.$ ; Bar. 29.66; Ther.  $87^{\circ}$ . P. M. wind S. W. b. S.† hard gales lying to. The same to midnight.

23rd Oct.—9 A. M. wind marked S. S. W. hard gale. Lat. by Indff. Obs.  $19^{\circ} 30' N.$ ; Long. Acct.  $88^{\circ} 04'$ , Bar. 29.68; Ther.  $86^{\circ}$ . At 3 P. M. wind S. W. b. W.; 6 P. M. W. S. W. moderating and wind hauling to the westward.

24th Oct.—3 A. M. wind W. N. W.; 6 A. M. N. W.; at 2, in 47 fathoms mud. Daylight fine; Noon Lat.  $20^{\circ} 32'$  north; Long.  $88^{\circ} 10'$  east; Bar. 29.74; Ther.  $86^{\circ}$ .

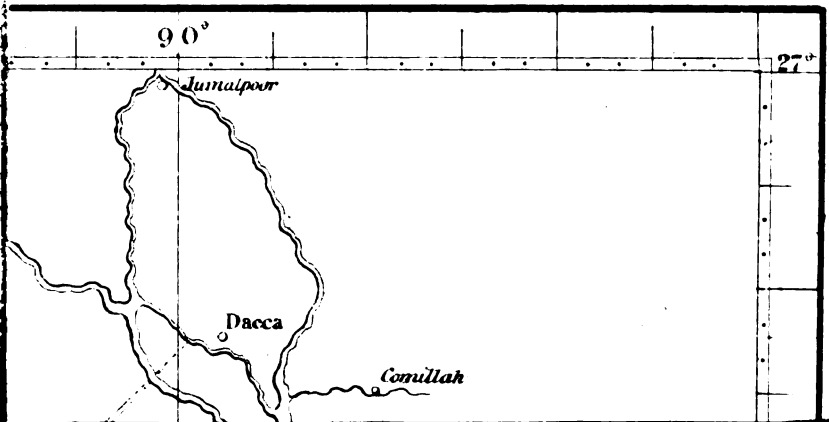
*Abridged Log of the Barque EASURAIN, Captain CLOUGHTON, from Penang to Calcutta—reduced to Civil Time.*

The *Easurain* was at Noon on the 20th Oct. 1851 in Lat.  $15^{\circ} 25' N.$ ; Long. Chr.  $91^{\circ} 56' E.$  P. M. moderate breezes (7 knots S. East and fine.) Bar. corrected to that of the Surveyor General's Office, 29.95. A heavy S. W. swell.‡ Midnight the same and ship rolling very heavily.

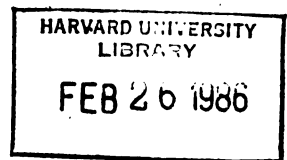
21st Oct.—Moderate 7 and 8 knot breeze, South to S. S. W. to Noon with a very heavy S. W. swell. Wind S. E., ship endangering her masts by rolling

\* Italics are mine, this bank was the body of the Cyclone.

† See remarks.



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so much. Noon the same swell. Lat. Obs.  $17^{\circ} 4' N.$ ; Long. Chr.  $90^{\circ} 33' E.$ ; Bar. 29.93; Ther.  $86^{\circ}$ ; Current S.  $\frac{1}{2}$  W. 20' in the 24h. P. M. wind South ship running 6 and 7 knots to the N. b. W. with a heavy cross sea from W. N. W. to S. W. rolling gunwales under and masts in constant danger;\* at 5 Bar. 29.95; at 6, 29.88; at 8, 29.90; midnight 29.88. Strong gales South; cloudy, and very heavy turbulent sea.

22nd Oct.—A. M. strong gales South and cloudy, turbulent cross sea. 4 A. M. Bar. 29.89; 6 A. M. Bar. 29.88. Fresh gales and passing squalls with a dark threatening appearance to W. S. W. 8 A. M. Bar. 29.90. Close reefing. Noon strong gales and a tremendous cross sea. Lat. Obs.  $19^{\circ} 39' N.$ ; Long. Chr.  $89^{\circ} 55' E.$  Bar. 29.88; Ther.  $86^{\circ}$ ; Current S. E. b. E. 16 miles. P. M. ship steering 7 knots to the N. b. W.  $\frac{1}{2}$  West strong gales S. S. W. course N. W.  $\frac{1}{2}$  W. 7 knots to 4 P. M. when hove to. Bar. 2 P. M. 29.88; 4, 29.88; at 6, 29.84; at 8, 29.87; midnight 29.85. Hard gales and tremendous sea from S. W. to west.

23rd Oct.—A. M. Bar. 29.82; 4 A. M. 29.84. Daylight hard gale S. to S. S. W. and high sea Bar. 29.88. Noon the same and sea as before S. W. to west; Lat. Obs.  $20^{\circ} 11' N.$ ; Long. Chr.  $89^{\circ} 41' E.$ ; Bar. 29.85; Ther.  $84^{\circ}$ . P. M. wind S. S. W. to S. W. Lying to as before, sea the same; 2 P. M. Bar. 29.80; at 3, 29.76 dark gloomy appearances to West and increasing sea; at 6, Bar. 29.76. *A strange phenomenon appeared all at once. The sky from west, northerly, to north easterly, assumed a lurid hue like fire and continued to appear so for about three quarters of an hour.*† At 8, Bar. 29.78. tremendous sea continuing; midnight Bar. 29.84.

24th Oct.—4 A. M. Bar. 29.00; moderating; 5 A. M. wind S. W. to West sea going down fast; Noon Lat. Obs.  $19^{\circ} 54'$ ; Long. Chr.  $90^{\circ} 24'$ ; Bar. 29.10; Ther.  $65^{\circ}$ , fresh breeze and cloudy.

*Abridged Log (from a tabular Extract) of the Ship LORD PETRE,  
Capt. MIDDLETON, from the Mauritius bound to Calcutta.*

21st Oct.—At Noon in  $19^{\circ} 20'$  North Lat.; Long.  $89^{\circ} 54'$  East. Wind S. W. to S. b. E. South and S. b. E. light vessel bearing N. W. 120 miles. Bar A. M. 29.86; P. M. 29.90 and 29.86; Ther.  $75^{\circ}$  and  $77^{\circ}$ ; A. M. squally;

\* These seas were the rearward sea of the Cyclone and the regular Monsoon sea.

† I have put this in Italics, but the hour of the day and its appearance between west and north leave no doubt it was an effect of the sunset; but from the bearing of the Cyclone disk, it was also the sunlight seen *through* it, and we have thus perhaps in part, here one explanation of the phenomenon of the red sky as an effect of refracted light; though not for the long periods during which it has been observed.

4 p. m. hove to. Dark squally weather. Midnight strong gale, under close-reefed main topsail, &c.

22nd Oct.—Wind S. b. E. Bars. 29.78 and 29.80; p. m. 29.70 and 29.70; Ther. 78°; Noon Lat. 20° 02' N.; Long. 89° 20' E. A. m. strong gales to 8; at Noon moderate and cloudy, but p. m. strong gales and squalls with severe lightning. Hove to as before.

23rd Oct.—Wind S. b. W. and S. S. W., S. W. b. W. and W. S. W. Bar. 29.70 and 74 to 78. At 9 A. m. Light Vessel station calculated to bear N. W. 50 miles: Noon Lat. 20° 29' N.; Long. 89° 14' E.; 6 A. m. hurricane till 9 A. m.; at Noon fresh gale; midnight dark squally appearance to the S. W. with much lightning.

24th Oct.—Wind West to W. b. N. Bar. 29.82 and .85 to .87 and .90: Noon Lat. 19° 51' N.; Long. 89° 51' East. From 2 to 8 A. m. much lightning and heavy rain. Noon fine weather.

#### *Ship FAZEEL CURRIM.*

The *Fazeel Currim*, on the 21st October, when in about Lat. 19° 30' N.: Long. 89° 40' E. experienced a severe gale which lasted about 60 hours with occasional lulls; sent down top gallant yards and masts and housed mizen topmast; bore up for Sand Heads 24th October, at 7 A. m.

#### *Abridged Log of the Ship GEORGIANA, Capt. WILLIAMS, from Liverpool to Calcutta, arranged to Civil Time.*

Date.	Bar. No. 1.	Bar. No. 2.	Symp.	Ther.	Wind.	Remarks.
Oct. 19th, 1851.	29.90	29.97	29.45	89	E. S. E.	p. m. moderate breeze and cloudy with smooth water; stood in and anchored at 2.30 p. m. in 9½ fms. veered out to 50 fms. on best bower; current running strong to the W. S. W. storm glasses very much agitated, my Bar. No. 1, has a very large tube and I have never before in the worst of weather witnessed such a pumping motion, it pumps up and down as much as a full tenth of an inch and the water is smooth, very suspicious. Sent down royal and top gallant yards. Mid :
	29.93	29.93	29.43	89	East.	part light airs and calms with occasional flashes of lightning to the East and misty rain.
20th Oct.	29.92 30.01	29.92 30.01	29.43 29.55	.. 88	.... ....	8 A. m. looks threatening to the S. E. breeze freshening got under weigh and stood to the S. E. to 25 fms. and in to 10.

<i>Date.</i>	<i>Bar. No. 1.</i>	<i>Bar. No. 2.</i>	<i>Symp.</i>	<i>Ther.</i>	<i>Wind.</i>	<i>Remarks.</i>
Oct. 20th, 1851.	29.91	29.90	29.35	89	E. S. E.	Noon moderate and has a soft wet appearance, no observations, very little current. Lat. Acct. $21^{\circ} 4'$ Long. $88^{\circ} 40'$ .
	29.86	29.86	29.45	87	E. S. E.	P. M. Damp cloudy weather with light squalls. 4 P. M. finding the current again setting strong to the W. S. W. anchored in 10 fms., mud and sand with black shining specks; sent down top gallant masts.
	29.88	29.89	29.40	88	....	Mid. part light airs; a bank to the S. E. with lightning in that quarter and a swell from the Eastward and south.
21st Oct.	29.84	29.84	29.35	..	E. S. E.	4 A. M. ditto weather Bar. very unsteady. Daylight, prepared for sea; breeze increasing and sea getting up.
	29.83	29.72	29.34	..	S. E.	10 A. M. looks suspicious to the E. S. E. and South, got under weigh with all possible speed and stood to the S. W. current setting to the north; noon wind and sea increasing. Weather very clear over head with a dark gloomy appearance to the eastward round to south. Lat. Obs. $21^{\circ} 00' N.$ Long. $88^{\circ} 30' E.$
	29.77	29.76	29.30	89	S. E. b. S.	P. M. increasing breeze squally; sea getting up rapidly; 3 P. M. 12 fms. water.
	29.68	29.67	29.20	88	S. E. b. S.	4 Weather looks wild, heavy head sea S. W. carrying all possible sail to get an offing.
						6 P. M. ditto increasing; double reefed; close reefed mizen and too reefed main sail; a sea burst the jib and it blew to ribbons.
	29.60	29.60	29.18	88	S. E. b. S.	8 Tremendous head sea, heavy squalls with lightning, close reefed.
	29.57	29.52	29.15	..	....	Midnight, tremendous squalls, incessant lightning, heavy cross sea S. E. and S. W. ship very labour-some; split main sail and it blew to pieces; fore-castle full of water brought crew aft to live; sounded in 35 fms. stiff bottom.
22nd Oct.	29.53	29.52	29.10	87	S. S. E.	4 A. M. gale very severe 4.30 A. M. Foresail and foretop-sail blew out of the bolt rope bent another fore-sail by the reef and set it; got another topsail on the fore-castle but was obliged to lash it to the Cap-stan, not possible to get it aloft; seas running over all.



<i>Date</i>	<i>Bar. No. 1.</i>	<i>Bar. No. 2.</i>	<i>Symp.</i>	<i>Ther.</i>	<i>Wind.</i>	<i>Remarks.</i>
Oct. 22nd, 1851.						6.15 A. M. Wind veering more to the South wore ship to N. E. in 25 fms. mud. Extreme of Palmyras reef S. W. b. W. 15 miles.
						10 A. M. a Tremendous squall of wind and rain, ship almost on her broad-side, but there was nothing for it, but hold on every thing, Burst the forestorm stay sail, mizen stay sail blew away, wind veered to S. W. ship heading up E. S. E. took the current on the lee beam and at noon, ship is in 35 fms. water.
	29.48	29.47	29.04	86	S.W.b.S.	P. M. a hard gale and violent squalls ship under reefed foresail and storm main stay sail and making much better weather; checked the yards and kept ship E. S. E. bent the F. topsail close reefed and handed it
	29.53	29.52	29.06	84		4 P. M. ditto; glasses on the rise.
	29.63	29.62	29.15	84	S. W.	Midnight violent squalls, tremendous cross sea, larboard bulwarks washing away.
23rd Oct.	29.68	29.68	29.20	82	....	4 A. M. 45 fms. the gale appears broke.
	29.69	29.69	29.25	..	.... S. W.	8 A. M. ditto weather. Noon more moderate but the weather has a very dirty appearance, looks very wild, sounded 45 fms.
						I allow the ship to be about 25 miles south of the Floating Light.
	29.70	29.70	29.25	..	W. S. W.	P. M. strong gale and squally, set the top sails close reefed.
						8 P. M. weather breaking up; lightning to the westward.
	29.78	29.77	29.30	..	....	Midnight squalls with heavy rain thunder and lightning to the eastward; sea going down fast.
						A. M. moderate and fine.
24th Oct.	29.81	29.80	29.35	88	West.	Noon ditto Lat. Obs. 20.34 N. Long. 89.10 E.

By a comparison obtained here with the standard, for Capt. Williams's Bars. No. 1 required a correction of  $+ 0.130$ , and No. 2, of  $+ 0.07$ , to reduce the indications to ours here, and these corrections have been made by me, H. P.

*Letter and Barometrical Tables from Mr. W. BARCKLEY,  
Superintendent of FALSE POINT Light House.*

I beg to forward you statements, and memoranda of the Cyclone, that visited *False Point*, and its vicinity.

1st. In the forenoon of the 21st inst. I saw heavy clouds rising to the Northward and Eastward, occasionally with heavy rain. At noon the wind N. N. E. with heavy squalls and rain at intervals; at 4 P. M. I took great notice of the scuds from the Northward and Westward, and a lower scud from the S. E. crossing each other with a haze, and a red tinge. Round the horizon, was a circle of haze, and the breeze continued to freshen, till it increased to a strong gale, and veered from N. N. E. to S. E. with heavy passing showers, till 3 in the morning of the 22nd, with a falling Barometer all the time; but at times with a clear sky over head, and a thick haze round the horizon. At 5.15 A. M. of the 22nd inst. the Cyclone was at its highest, and at 7.30 A. M. it lulled to a stark calm, and then it set in a heavy mist all round, but very black to the southward. The calm lasted from 7.30 A. M. to 8.30 A. M. and then began to blow hard till it increased to blow as heavy as it did to the S. E.\* and veered from South to West till 3 P. M. when the Cyclone broke to nearly a calm with a rising Barometer.

2nd. I also make this remark on the storm wave; that the sea we could hear from 10 to 15 minutes, before the first roller reached the Light House, and it came in with three regular steady rollers, and then it was done, and left the whole place in an inundated state, carrying every thing before it; leaving us without a drop of fresh water about the place. It was really frightful to hear it. If I had been a landsman, I should thought it was an earthquake; it has swept one-third of Dodwell's Island away, the height of it† was 23 feet, but this storm wave extended to a place called Tuldundah, 24 miles from the mouth of the Mahanuddee river; this information I received from my men whom I sent out in different directions, from W. N. W. to S. S. W. distance about 30 miles each way from the Light House. At Tuldundah, even the embankment was washed away. The names of the places that suffered greatly are Tikree, Kodakon, Rogonatpore, Nowgong, Boliparra, Danton, Damapore,

\* So in MSS.

† The rise—W. B.

and Paradeep; all these villages are nearly washed away, and about 1,430 head of cattle, have been accounted for as lost, and 120 men: my men passed a great number of bodies, floating in the Mahanuddee river.

3rd. I have suffered greatly at the Point, 13 panes of glass in the lantern, lightning-conductor, lamps, and reflectors gone; all the men's and other out-houses swept away, and my assistant and his family completely washed out of their house. The whole of my boats completely destroyed with the exception of my little jolly boat, and she was stove in. This is the most severe Cyclone I have experienced for the 31 years I have been at sea, yet I find they felt very little of it at Cuttack, which is 60 miles from here, in fact I have nearly lost my all. On Sunday the 26th inst. I boarded the *Margaret S. Kelly*, in distress, with her ensign union down, going off through the heavy surf in my little jolly boat, about 10 miles off, and the Captain stated that he had seen the Black Pagoda, the night before the Cyclone came on; I questioned him about his Barometer, but he could not give me any information, for he had not a light on board his vessel all night, but he mentioned to me, *that such awful thunder and lightning he never experienced, but we had none at the Point*: he could not even tell me, how the winds varied.

I herewith enclose a register of the winds and Barometer, with remarks at False Point.

*A Register of Winds and Barometer with Remarks.*

21st October, 1851.

Hours.	Baromt.	Winds.	Remarks.
Noon.	29 „ 85	N. E.	Strong breezes from the North and East with heavy squalls, and showers of rain, with every appearance of a strong gale; sky very clouded.
1 P. M.	29 „ 80	„	
2 „	29 „ 70	„	
3 „	29 „ 70	„	
4 „	29 „ 60	N. N. E.	At 4 P. M. Scuds from the North and East and a lower scud from the S. E. crossing. Clouded horizon and clear over head with light rain.
5 „	29 „ 55	N. E.	
7 „	29 „ 51	„	
8 „	29 „ 50	„	
9 „	29 „ 52	„	
10 „	29 „ 60	East.	
12 „	29 „ 50	N. E.	

22nd October, 1851.

2 A. M.	29	45	E. N. E.	2 30 A. M. The Sea made a complete breach up to the Light House like the rush of the bore; and carried away all the boats, boat-houses, anchors and chains, and gates of the inclosure.
4 "	29	22	East.	
4 " 15	28	60	"	
5 " 15	28	5	S. E.	
6 "	28	30	"	
7 "	28	10	"	7 30 A. M. Stark calms with heavy rain.
9 "	28	5	Calms.	9 30 A. M. Blew a complete hurricane with the wind at South, with rain.
10 "	28	21	South.	
10 " 30	28	30	"	
11 "	28	51	"	
11 " 30	28	70	"	
Noon.	29	0	S. W.	At 3 P. M. Gale broke with the wind at West. At 4 P. M. The water subsided.
1 P. M.	29	30	S. W.	
9 "	29	45	"	
2 " 15	29	38	"	
3 "	29	50	West.	
4 "	29	50	"	
4 " 30	29	54	"	
5 " 30	29	60	"	
7 "	29	60	"	
8 "	29	60	"	
9 "	29	65	"	
10 "	29	65	"	
11 "	29	70	"	
12 "	29	70	"	

23rd October, 1851.

2 A. M.	29	70	West.	Fine weather throughout.
4 "	29	70	"	
6 "	29	70	"	
8 "	29	72	"	
10 "	29	72	"	
12 "	29	72	"	

*Abridged Report from Mr. A. BOND, Master Attendant, Balasore.  
To Captain ROGERS, Superintendent of Marine, Calcutta.*

SIR,—I have the honor to report that on the 22nd inst. whilst in charge of the *Orissa* bound to Calcutta, I experienced a severe gale, similar to the Cyclone of April, 1850, by which I have lost the *Orissa's* main and fore-masts, having cut them away to save the vessel from being beached and filled, whilst drifting on shore with two anchors ahead.

*On the 20th of October.*—It appeared cloudy and the Bar. was at 29.66; but falling slightly, wind S. E.; I therefore ran in from the mouth of this river (thinking something must have caused the tides to be earlier by 2 hours than customary) as far as I could to get room to veer away cable, and made all snug. On the 21st, Bar. fell to 29.60 with rain but no indication of a

storm, wind E. S. E and squally at times with rain and heavy sea, five vessels ran ashore; six ran into this river.

22nd Oct.—The wind at E. and E. N. E. Bar. A. M. 29.50; at 1 P. M. Bar. 29.55; wind freshening, tried to get down the fore yard on deck, found the nut of the chain slings so jammed, that the yard could not be got down. At 3 P. M. Bar. 29.45; very squally; Brig drifting with the best bower ahead; let go the small bower, which brought her up, blowing hard E. N. E. to N. E. both anchors ahead; at 4 P. M. Bar. 29.40, very heavy sheets of rain with heavy gusts at N. E.; at 4-50 P. M. Bar. 29.20, found the vessel dragging both anchors, and the sea and river one sheet of water, cut away the fore mast which fell on the main stay and sprung the mainmast, which I also ordered to be cut away, when she brought up and held on; at 6 P. M. Bar. 29.10, wind N. E. to N. N. E. heavy rain with roaring gusts; at 8 P. M. Bar. 29.1, wind N. with similar gusts of wind and sheets of rain. The Bar. remained at 29.1 till high water, when at 9 P. M. the wind veering round from N. W. to W. the gale decreased but blew strong from the westward till 3 A. M.

23rd Oct.—A. M. at daylight found all the vessels ashore (but one) with masts gone, and some turned over which had run into the river on the 21st. Out of 24 vessels only one vessel is afloat besides the *Orissa*; 5 vessels in pieces, the rest are wrecks down the coast.

#### *Barque SCOURFIELD, CAPTAIN SKELTON.*

The *Barque Scourfield* Capt. Skelton was lying at anchor close to the Pilot vessel at the station, but had been unable to get a pilot put on board before the Cyclone commenced, and driving from her anchors, was eventually lost on the coast of Balasore Bay. A long account of her loss, and of the sufferings of her crew was published by Capt. Skelton in the Calcutta *Englishman*, which after detailing her attempts to work up to the station in company with a French ship which afterwards foundered or was lost on the sands with all hands on board, continues thus:

Tuesday, October 21st.—A fresh south easterly wind and squally. At 10 A. M. very squally with heavy swell setting in from the southward. At 11 A. M. Pilot brig passed close to us under sail, and when signalized for a Pilot, answered—"when the weather moderates." Wind kept increasing with hard squalls. At 1 P. M. bent my best topsails and courses, struck top gallant yards and made every preparation to slip, intending to do so if I saw any possibility of getting to the southward. During the night the ship rode very heavily, cable to the bare end.

*Wednesday, October 22nd.*—Blowing hard from south-east with roaring gusts. At 4 p. m. she started the anchor and dragged. I immediately let go the other and gave her 50 fathoms, which brought her up, both then appearing to have an equal strain.

Bar. rose and fell from 29.70 to 29.60. At daybreak I found by the Brig that I had dragged about 3 miles; it was then blowing a hard gale at south-east. At 8 a. m. in a tremendous pitch she parted both cables, I got her head to south-west, slipped the starboard chain, hove in the port, and set the reefed courses. About 3 hours after, the sails blew to ribbands (although nearly new) in a violent gust that also took the mizen topmast and top-gallant masts with it. Bar. at 29.50. From this time the gusts of wind became more frequent with increased strength, for each successive one brought something down; the topsails though securely stowed were gradually blown from the yards, the quarter boat was blown up the mizen rigging, the weight of which carried away the mast and it went over the side. Bar. now fell considerably. At 4 p. m. we were laid on our beam ends (although a remarkable stiff vessel), and driving to the westward, about 6 miles an hour fearfully fast, and knowing that now I could not be far from the land, I cut away the masts, deeming it the only chance for the safety of our lives, and let go the remaining anchor which we had with great exertion got over the bows and bent to it the remainder of the port chain. As soon as the masts were gone, and the ship came head to wind, it rushed in at the doors of the poop and took the deck of it clean over the taffrail, leaving the sea to finish, which it soon accomplished; sweeping away all our instruments, charts and other effects.

She continued dragging the anchor till about midnight, when it moderated; the vessel now rolled fearfully, and the wreck of boats, galley, &c. rendered it impossible to get upon deck. During the extreme violence of this hurricane, the Bar. fell below 28 inches, but it did not do so until that time. As I have lost all memoranda of it, I cannot recollect how low it did fall. This was indeed a fearful night, not one of us expected again to see daylight; but it was God's mercy to spare our lives.

*On the 23rd Oct.*—A heavy sea and fresh westerly wind, and from this time the ship utterly dismasted and without rudder, masts, chart, compass or a serviceable anchor; the stock and one fluke of the only remaining one being gone. Drifted about Balasore Bay till Wednesday the 29th when she grounded, the crew saved themselves on rafts and arrived safely at Kedgeeree.

It appeared by the evidence on a trial in the Marine Court which arose out of the loss of this vessel that as early as the 19th of October, the set to the westward, at the Light vessel, which had begun in the night between

the 18th and 19th was from 1 knot to  $1\frac{1}{2}$  knot per hour during the whole of the 19th.

*Abridged Log of the Ship LUCKNOW, Capt. FAUSET, leaving the Pilot.  
From Calcutta bound to Demerara, with Coolies on Board—Civil  
Time.*

20th Oct.—Pilot left the ship at 9.30 P. M. on the 19th. Midnight squally and rain, wind variable from Eastward. Ship standing to the South and S. S. W.; 6 A. M. wind E. S. E.; 8 A. M. N. East. Noon Lat. by Acct.  $20^{\circ} 40' N.$ ; Long. Acct.  $87^{\circ} 54' East$ . P. M. Wind East; ship standing South 4 knots, cloudy weather; at 10 P. M. wind N. E.; midnight increasing with rain. Double reefs.

21st Oct.—2 A. M. strong gales N. E., but course is marked S. b. W. and the wind N. East yet only 4 knots! 2 A. M. heavy head sea; 6, heavy gales; 10 A. M. hove to. No position given at Noon. By Log worked up, she appears to be at 10 A. M. in Lat.  $19^{\circ} 13' N.$ ; Long.  $87^{\circ} 47' E.$  At noon in Lat.  $19^{\circ} 9' North$ ; Long.  $87^{\circ} 43' East$ . Strong gales with rain (direction of wind not marked) and heavy squalls. P. M. wind is marked N. W. and at 8 P. M. S. W. or veering a point in an hour. At 6, gale moderating, midnight stiff gale and cloudy.

22nd Oct.—A. M. the same; wind apparently S. W. to Noon. Making sail gradually. Noon, gale moderating. Lat.  $17^{\circ} 44' N.$ ; Long.  $87^{\circ} 30' East$ .

*Abridged Log of the H. C. P. Vessel CAVERY, Mr. Branch Pilot  
E. BARTLETT, proceeding to the Cruizing Station—Civil Time.*

21st Oct. 1852.—Winds E. b. S. to S. E. b. S. and squally. Heavy rain with thunder and lightning from N. E. to N. W. at 8 P. M. At 1 A. M. anchored near Saugor Sand Buoy; A. M. weighed to proceed down; 11 A. M. wind S. E. b. S. blowing fresh; in 2nd reefs. Vessel now working to seaward from 18 fathoms water; midnight strong and increasing breeze from E. S. E. Bar.\* 4 A. M. 29.99; at 8h. 29.95; at Noon 29.95. At 4 P. M. 29.93; at 8h. 29.92; at midnight 29.95.

22nd Oct.—Winds from E. b. S. to W. S. W. heavy hurricane from E. S. E. to S. S. W. A. M. moderate gale from E. S. E.; 1-15, increasing; 2 A. M. in 23 fs.; at 2.30 A. M. wind oscillating from E. S. E. to S. E.; 4 A. M. in 30 fs. water; 4.30, gale increasing; daylight heavy gale and hard continued squalls from E. S. E. to S. E. and tremendous sea; topsails on the cap furlled mainsail; obliged to cut away foresail. In 25 fs. water; 8 A. M. 22

\* Corrected by  $+0.10$  from a comparison with the Standard.

fs. water; gale increasing to a hurricane; 10 A. M. 16 fs. water. Vessel on her beam ends and settling down; cut away topmasts and lost heads of the lower masts with them; sea rising in pyramids; 11 A. M. had drifted into 12 fs. Anchored, and finally brought up in 9 fs. with two anchors. 2 P. M. wind *veered* to S. S. W. blowing with equal force, tearing the furled sails from the gaskets. 4 P. M. Bar. began to rise, but gale unabated.; 8 P. M. wind going round to the westward; midnight gale moderated at W. S. W. Bar. at 4 A. M. 29.69; at 5h. 29.65; at 6h. 29.50; at 7h. 29.40; at 8h. 29.37; at 10h. 29.30; at 4 P. M. 29.45; at 7 P. M. 29.60; at 8h. 29.75; at midnight 29.80.

23rd Oct.—Towards morning a great deal of lightning to the S. W. Position about Lat. 20° 44' N.; Long. 87° 20' East; winds variable from West to N. N. W. Bar. at 4 A. M. 29.90.

*Abridged Log, Tables, and Remarks of Mr. Branch Pilot, S. RANSOM, Commanding H. C. P. V. TAVOY, in the Eastern Channel.*

We are indebted, and very greatly so, to Mr. Ransom for the following interesting documents, of which I arrange the extracts useful to our purpose in a somewhat different form than that in which they reached me; and I abridge them also at times to economise details. The remarks given are most valuable, and cannot be read with too much attention.

*From the 6th of Oct. 1852 up to the 17th*—We had one delightful spell of fine weather (the *Tavoy* being stationed in the Eastern Channel); pleasant southerly breezes and a high Barometer; the 18th showed a decided change in the state of affairs, and drew my attention to it immediately. A. M. calm, sultry, Ther. higher than usual, noon squalls from North to East with excessive heavy rain, wind unsteady, and much sharp thunder and lightning. This same suspicious weather continued to increase daily up to the 20th, before the glasses became affected by it; after that the enclosed table will shew you the gradual decline of them, and although the total depression was not great, still the weather was for 24 hours very severe and the sea tremendously high, breaking, and confused, coming principally from the S. S. E. to S. E. until the wind got to the W. S. W. when it was a pyramidal mass of waves running one against the other,\* the weight of rain in the frequent fierce squalls was beyond any thing I ever witnessed; it was a sheet of falling water "*en masse*." Occupying the Floating Light station (Eastern Channel) and being at anchor, I had little else to do but to prepare my bark for the

\* The wind against the track.



evident coming struggle ; and well she behaved through the whole of it, with top gallant masts down on deck, and 160 fs. of good coir cable out ; she braved the whole without starting an inch from her position. However, I am of opinion that we did not lay in the heaviest track of this breeze although very near it. The glasses were at one time very uneasy, and a sudden fall occurred in the Marine Barometer which drew my instant attention. I thought I might have made a mistake in the reading off ? but No, repeated examinations showed me I was correct, the Aneroid and Sympiesometer followed the movement subsequently, but not so quick as the Marine Barometer (by Newman, London). The abstract will show you the course of the wind from the 18th to 8 p. m. of the 23rd.

*On the 24th.*—After the weather had become fine, a strong set to the S. E. occurred and brought down with it pieces of wreck, painted yellow and white, also quantities of dried cocoanuts,\* but the most remarkable sight was the quantity of dead wild fowl, such as ducks, snipe, curlew and others ; which poor birds were literally, I believe, pressed into the sea by the sheet of falling rain I have before mentioned, many of them were about us during the gale, but could not fetch on board. There was no forked lightning during this breeze but occasionally bursts of *light*, N. E. and S. E. like the “Northern Lights” in Europe ! The Temperature of the atmosphere was also agreeable and almost constant, without any hot blasts. The crisis of the gale I should say was with us from 4 p. m. of the 22nd to 4 a. m. of the 23rd when the wind had gone round (southerly) to W. S. W. and then sulked itself out in decreasing squalls.

I have printed the following table entire, although some of the remarks are anticipated in the preceding letter. But the whole is so complete a register of the passage of a Cyclone close to the Light Vessel and of the various atmospheric disturbances and signs attending it, that I would not change any part of the record. Mr. Ransom in a subsequent letter says his Sympiesometer continues to increase in difference from the other instruments, so that it may have been a little deranged at the time of the Cyclone.

\* Which Mr. Ransom supposes must have been from the wreck of a Maldivé boat.

*An Abstract of Observations by three Instruments, from the 18th of October to the 23rd of October 1851 inclusive, being the whole period from the origin of a Cyclone to its subsidence; with the course of the wind and remarks. By Mr. B. Pilot, S. RANSOM. II. C. P. V. Tuvoy, Floating Light Station, Eastern Channel.*

Date.	Time.	Ther.	Barometer by J. Newman.*	Aneroid by E. J. Dent No. 5067.	Symptoms— ter by Troughon and Simms.	Direction of Wind.	Remarks.
Oct. 18th	8 A. M.	85.0	30.136 Ins.	30.18 Ins.	30.60 Ins.	Calm.	Daylight calm and sultry; clouds collecting to the N. E.
	2 P. M.	82.30	29.926	.. 10	.. 57	North to East.	noon a fresh squall from the Northward, going to the East-
	8 P. M.	83.30	.. 936	.. 15	.. 66	E. N. E. to E. S. E.	ward; heavy rain, thunder and lightning. P. M. dark cloudy weather, wind moderate, Sea smooth.
19th	8 A. M.	82.00	.. 966	.. 15	.. 68	North to E. S. E.	Increasing breeze, and squally weather; wind variable from
	2 P. M.	82.00	.. 986	.. 07	.. 55	E. S. E.	North to E. S. E. P. M. The squalls gathering strength,
	8 P. M.	83.00	.. 956	.. 12	.. 66	E. S. E.	veered to 100 fms. cable.
20th	8 A. M.	81.00	.. 966	.. 15	.. 70	E. S. E.	Increasing breeze with frequent hard squalls and heavy
	2 P. M.	79.30	.. 856	.. 07	.. 60	E. S. E.	rain during them, sea beginning to rise, sent down top
	8 P. M.	80.30	.. 876	.. 07	.. 62	E. S. E.	gallant mast and rigging.
21st	8 A. M.	81.00	.. 846	.. 04	.. 57	E. S. E. to S. E.	Blowing hard E. S. E. to S. E. wind unsteady at times and
	2 P. M.	81.30	.. 776	29.98	.. 48	S. E. to S. S. E. back to S. E.	gusty, clouds dense, atmosphere dark and gloomy, evident
	8 P. M.	81.30	.. 806	30.00	.. 56		symptoms of worse weather approaching; veered to 160
22d	8 A. M.	81.00	.. 786	29.98	.. 54	E. S. E. to S. E.	fms. cable and made all preparations.
	10 A. M.	80.45	.. 756	.. 56	.. 54	S. S. E.	Blowing a gale, (not hard) but hourly increasing; a very
	Noon.	80.45	.. 656	.. 90	.. 46	South.	high Sea coming in from S. E. Noon blowing a heavy gale,
22d	2 P. M.	80.45	.. 566	.. 87	.. 44	"	and the Sea breaking dangerously.
	4 P. M.	80.30	.. 536	.. 85	.. 38	"	P. M. A severe gale and tremendous cross Sea, the rain
	6 P. M.	80.20	.. 526	.. 83	.. 36	S. S. W.	which fell in the squalls now was more like sheets of water.
23d	8 P. M.	80.00	.. 656	.. 88	.. 45	S. S. W.	Sent down everything from aloft that would hold wind.
	10 P. M.	80.00	.. 696	.. 85	.. 40	S. S. W.	several extraordinary flashes of light in the S. E. and N.
	Midnight.	80.00	.. 556	.. 80	.. 34	S. S. W.	E. similar to the Northern lights.
23d	2 A. M.	80.00	.. 536	.. 80	.. 34	S. W.	A severe gale, with a high dangerous breaking Sea running,
	4 A. M.	80.00	.. 606	.. 82	.. 36	S. W.	several broke on board, that did no damage, beyond driv-
	6 A. M.	80.00	.. 646	.. 85	.. 45	S. W.	ing in a balls eye. From 4 P. M. of the 2nd to 4 A. M. of 23d
23d	8 A. M.	80.00	.. 656	.. 86	.. 47	S. W.	I consider we had the hardest of this gale, and when the
	10 A. M.	80.00	.. 676	.. 88	.. 52	W. S. W.	wind got to the W. S. W. the Sea was heavy and pyrami-
	Noon.	80.00	.. 656	.. 87	.. 48	W. S. W.	dical, causing the vessel to labor much, but throughout the
23d	2 P. M.	80.00	.. 666	.. 88	.. 48	W. N. W.	while of the breeze she did not start an inch from her
	8 P. M.	79.30	.. 806	.. 59	.. 57	N. W.	anchorage, the Floating Light buoy bearing the same when
							the weather broke, as at its commencement. The Salween
21st 22d	8 P. M.		Depression. 29.876	Depression. 30.0	Depression. 30.56		P. V. drove about 2 miles to the N. E. with the W. S. W.
	4 P. M.		29.536	29.80	34		part of the breeze.
	Fall in	20 Ins.	.. 270	in 28 hs. 20	in 28 hs. 22		

\* Correction of +0.056 made to the original, being that required by a comparison with the Standard.—H. P.

*Abridged Extract from the Log of the H. C. Floating Light Vessel  
HOPE, Commander H. HILLER; at the Saugor Point Station—Civil  
Time.*

21st Oct. 1852.—A. M. moderate N. East winds, cloudy and rain; 8 A. M. stronger winds; dirty looking weather. Noon wind increasing at East cloudy and squally with passing showers. 4 P. M. strong S. S. E. winds and cloudy dirty weather with frequent heavy squalls: sunset the same; 8 P. M. blowing hard at S. E. b. S. attended with heavy squalls, thunder, lightning and rain and a heavy sea; 10 P. M. veered to 115 fathoms cable. From 9 P. M. to midnight heavy gale at S. S. E. attended with a heavy sea and heavy gusts, and cloudy dirty weather with rain. Aneroid morning\* (9 A. M.?) 30.40; Ther. 75°; † Bar. A 29.80; Ther. 80°; Bar. B 29.85; Ther. 81°. Noon Aneroid 30.37; Ther. 74°; Bar. A 29.75; Ther. 80°; Bar. B 29.85; Ther. 82°. Night (8 P. M.?) Aneroid 30.75; Ther. 78°; Bar. A At 29.70; Ther. 80°; Bar. B 29.81; Ther. 80°.

22nd October.—Strong S. S. E. gales, heavy sea, squally and rain to 8 A. M. Daylight to noon, the same, with thick dirty cloudy weather. Sunset, gale increasing to a hurricane attended with heavy squalls, and a heavy sea. At 6 P. M. driving, let go the second anchor, but the chain of the larboard anchor fouling and cutting the coir cable slipped it, 8 P. M. wind S. S. E. midnight a complete hurricane at S. S. E. with heavy squalls and a heavy sea with thick weather. Aneroid morning 30.40; Ther. 75°; Bar. A 29.81; Ther. 86°; Bar. B 29.85; Ther. 82°; 8 A. M. Aneroid 30.35; Ther. 76°; Bar. A. 29.75; Ther. 84°; Bar. B 29.80; Ther. 82°; 4 P. M. Aneroid 30.20; Ther. 76°; Bar. A 29.51; Ther. 85°; Bar. B 29.75—82. Midnight, Aneroid 30.10; Ther. 75°; Bar. A 29.10; Ther. 82°; Bar. B 29.10; Ther. 80°.

23rd Oct.—A. M. Blowing a complete hurricane at S. S. E. with terrific squalls and thick weather, heavy rain and sea. 1 A. M. a heavy squall struck the vessel and laid her on her beam ends washing away quarter boat; 8.40 A. M. vessel took the ground striking heavily; weather, so thick that no land could be seen; 8 A. M. hurricane “shifted to the westward with terrific squalls;” 9 A. M. cleared a little, found her on shore, a little to the northward at Fakeer’s Creek with 4 feet water in the hold. Three men of a Maldiv vessel with 42 hands on board, which had foundered, and the crew of the Barque *Bengalee*, came in sight. Noon more moderate at West; 8 P. M. strong W. N. W. winds. From A. M. to 4 A. M. the Aneroid fell from 30.10

\* Morning and night; so given throughout! I suppose at 9 A. M. and 8 P. M. are meant?

† So in MSS.

to 29.50 and then commenced to rise gradually. Barometer fell from 29.10 to 28.33; and then commenced to rise gradually.

*Abridged Log of the Ship VIRGINIE, CAPT. JURAS, from Calcutta bound to Madras and proceeding down the River. Log from Mr. Mate Pilot Alfred Bond. In Saugor Roads.*

21st Oct. 1852.—At anchor in Saugor Roads. Fresh breezes from E. b. N. to East, and E. S. E. with hard squalls and heavy rain throughout the 24 hours. Bar. at midnight 29.75. Noon 29.76. Midnight 21st—22nd 29.68.

22nd Oct.—Midnight strong breezes S. East; and cloudy; Bar. 29.68 at 1 A. M.; at 4 A. M. 29.65; at 8 . 29.60. At 6 A. M. wind S. E. b. E. Increasing bad weather appearances to Noon. All preparations made for it. 1 P. M. Bar. 29.57; 3<sup>h</sup>. 29.55; at 4<sup>h</sup>. 29.54; at 7<sup>h</sup>. 29.50; at 9<sup>h</sup>. 29.47; at 11<sup>h</sup>. 29.37; at midnight 29.30. At sunset thick and hazy with heavy banks of clouds to the south; sun of a pale brick colour; 9 P. M. driving; let go a second anchor; 11 P. M. gale increased to a hurricane blowing in terrific gusts, with a high short sea making a complete breach over all. At 11.40 cut away fore and main masts for the safety of the ship, lost bowsprit and mizen topmast.

23rd Oct.—Midnight the wind terrific, and to be compared to nothing but howlings and shriekings; the sky black, the sea rising in large masses in appearance like a wall approaching the ship, of a dull glowing muddy colour. The spray a continued sheet passing over the ship; 3 A. M. the height of the hurricane, gusts terrific, blowing away the boats, &c.; sea rising in pyramids, ship rolling deeply and nearly foundering at her anchors during the night; having 7 ft. water in the hold and throwing cargo over board. During these 24 hours the wind is marked at 1 A. M. South; at 2h. S. S. W. at 3h. West; at 5h. W. b. N.; at 6h. W. N. W.; at 7h. N. West; at Noon North; at 2 P. M. N. b. E.; at 5h. N. N. E.; at 7h. N. E.; at 8h. East and at 9h. S. East to midnight again. The Barometer is carefully registered for this day as follows:—

1 A. M.	29.14.	1 P. M.	29.47.
2	28.80.		49.
3	65.		53.
4	68.		53.
5	82.		54.
6	29.10.		54.
7	22.		55.

8 A. M. 2930.	1 P. M. 29.55.
9            33.	55.
10           39.	56.
11           43.	57.
12           45.	57.

Thermometer not marked.\*

Before daylight observed several broad glaring patches in the sky, of a pale reddish colour. Daylight hurricane, but steady, not in gusts; ship a complete wreck. 6 A. M. the wind from a hurricane decreased to a severe gale in heavy gusts, the sea a heavy surf sweeping the decks continually and destroying and carrying every thing before it. At 10 A. M. decreasing with a partial break in the sky. Noon clearing up. An American ship and the Barque *Bengalee* at anchor with loss of main and mizen masts, and the Floating Light on shore.

*Abridged Statement from the American "Ship WM. STURGIS" in Saugor Roads outward bound.—Civil Time.*

On Sunday the 19th Oct.—Came to anchor in Saugor roads and discharged steamer. On the 20th and 21st remaining at anchor in Saugor roads, weather squally and threatening, with rain and thunder and lightning.

Oct. 22nd.—Commences with heavy rain and moderate easterly breezes. At 2 P. M. wind increasing, made all preparations; 6 P. M. let go the star-board anchor and veered away on both cables; day ends with violent gales from E. to S. E. by S. with heavy rain.

Oct. 23rd.—Commencing this day at midnight; veered out the whole of both bower cables, gale increasing and a heavy sea bearing in from the southward. At 2.30 A. M. the wind veering from E. N. E. to S. and blowing with terrific violence, the ship commenced driving with both anchors; at 3 A. M. the ship still driving broadside to the wind. Mizen sands close to leeward, lee rail under water and the sea breaking over fore and aft, it was deemed proper to cut away the masts as the only means of saving ship cargo and lives on board.

The main and mizen masts were immediately cut away but the ship continued to drive. Then cut away the weather fore topmast back stays, and when the topmast fell over the side the anchors took effect, bringing the ship head to wind, fetching the bows under and sweeping her decks fore and aft; sounded in  $4\frac{1}{2}$  fathoms. From this time until daylight, employed clearing the wreck. At 6 A. M. the wind lulled for a few moments and then struck

\* I was unable to obtain any comparison with this ship's Barometer and the Standard.

from S. W. blowing with increased violence until 9 A. M. when the gale broke with wind at N. W.

*Abridged Log of the Peninsular and Oriental Company's Steam Ship  
PRECURSOR, Capt. GRIFFIN, at Cowcolly during the Cyclone.—Civil  
Time.*

On the 22nd Oct. 1851.—At 9.45 A. M. anchored, with Cowcolly bearing West and lower Buoy of the Auckland Channel E. S. E. in  $8\frac{1}{2}$  fs. wind at E. S. E. Heavy rain and thick windy weather. Bar. at 8 A. M. 29.905; \* at Noon 29.80; Ther. 80°. P. M. heavy rain, wind E. S. E. to S. E. and at 4 P. M. E. S. E. Bar. at 4 P. M. 29.945; 6 P. M. ship had dragged a little, wind blowing strong in squalls; at 8, Cowcolly light W.  $\frac{3}{4}$  S. About 9 P. M. light not visible, increasing gale to midnight. Bar. at 8 P. M. 29.785; Ther. 78°; at 11h. 29.385; midnight 29.235; hard gale with very strong gusts S. E. to S. S. E.

23rd Oct.—Gale increasing, stern boat blown to pieces; 2 A. M. terrific squalls of wind and rain. Wind marked as S. Easterly to Noon; steaming full power ahead to relieve strain on the cables which were both veered out and both ahead. At 3.30 A. M., during a perfect hurricane, both cables parted and at 4, grounded on the mud bank carrying away the rudder. At 4.30 A. M. wind suddenly lulled having been steady at S. S. E. but at 5, blowing furiously from N. E. to N. West. 4.30 A. M. [†Barometers rising astonishingly fast; “5, wind lulled. Set on, but wind chopped round suddenly to N. N. E. veering to N. W. blowing harder than before. Reversed the engines to keep the vessel on the bank, it being evident to all on board that had she been blown off the flat, no anchors could have held her and she must have been driven on to the Reefs, the Long sand, or the Mizen.”†] At 9 A. M. the wind again lulled and a moderate breeze commenced from N. W. Vessel on shore, with Cowcolly light house bearing W. S. W. Got afloat on the 24th. Barometer for this day as follows:

Bar.	Ther.	Bar.	Ther.
1 A. M. 29.175	78°	6 A. M. 28.835	78°
2 28.955	..	7 .985	..
3 .685	..	8 29.035	78°
4 .585	..	9 .395	..
5 .685	..	Noon .915	82°

\* The Barometer is corrected throughout by the addition of + 0.085 being its error by a comparison with the Standard. Some additions are made to the log from a MS. report of the Pilot, Mr. Beaumont.

† Pilot's notes within these brackets and † s.

*Abridged Log of the H. C. Buoy Vessel GRAPPLER, Mr. Branch  
Pilot, J. H. CHALKE, at Kedgeroe.—Civil Time.*

The H. C. Buoy Vessel *Grappler* was also blown on shore close to the *Precursor*, and Mr. Chalke has favoured me with a precise report with an excellent series of Barometric Observations, and a comparison for their correction.

*Extracts from the H. C. B. V. Grappler's Log of the 21st, 22nd and  
23rd October, at anchor in Kedgeroe Roads.*

<i>Barometer.*</i>			<i>Winds, weather and other remarks on the 21st October.</i>
6.30	A. M.	29.878	Fresh N. E. to East with squalls and rain first part.
10.30	„	29.870	Latter part hard squalls from east to S. E. with rain.
4.00	P. M.	29.828	
8.00	„	29.848	
<i>Barometer.</i>			<i>22nd October.</i>
6.00	A. M.	29.848	A. M. hard squalls from eastward with rain, to 7.0 P. M.
10.30	„	29.873	blowing in squalls with thick rain from E. N. E. to S. E.
3.00	P. M.	29.758	To midnight severe gales from S. E. to E. N. E., hard
4.00	„	29.708	squalls of dense thick impenetrable rain.
5.00	„	29.658	
6.00	„	29.608	
7.00	„	29.508	
8.00	„	29.478	
9.00	„	29.388	
10.00	„	29.368	
11.00	„	29.228	
12.00	„	28.988	
<i>Barometer.</i>			<i>23rd October.</i>
1.00	A. M.	28.888	A. M. 2.00 blowing a gale from S. E. to E. N. E. increas-
2.00	„	28.688	ing in strength every moment with dense rain 4.00. A. M.
3.00	„	28.748	blowing a hurricane, it being impossible to move on
4.00	„	28.978	deck to windward. Dense rain 6.00 A. M. moderating
5.00	„	29.028	and veering to the northward. At whence it suddenly
6.00	„	29.288	came down with fearful violence from the N. N. West-

\* Corrected to the Standard (by  $-.012$ ).—H. P.

<i>Barometer.</i>			<i>23rd October.</i>
7.00	A. M.	29.388	ward until 9.30 A. M. when it began to moderate coming round to W. N. W. Noon moderating considerably P. M. 4.00 fresh. W. by N. breeze.
8.00	"	29.438	
9.00	"	29.468	
10.00	"	29.528	
11.00	"	29.578	J. H. CHALKE, Commander, Grappler.
12.00	"	29.598	
4.00	P. M.	29.658	
8.00	"	29.738	

*A Register of two Barometers; one by Calderara the other by Troughton and Simms; a Sympiesometer with Thermometer attached by Troughton and Simms; and an Aneroid by Dent; during the Hurricane of October 22nd and 23rd, 1851, by Mr. B. Pilot, A. BEDFORD, River Surveyor, H. C. Surv. Brig Megna, off Mud Point.*

<i>Date.</i>	<i>Hour.</i>	<i>Ther.</i>	<i>Symp.</i>	<i>Aneroid.</i>	<i>Calderara Bar.</i>	<i>T. and Simms Bar.</i>	<i>Wind.</i>	<i>Remarks.</i>
1851					+0.227	+0.024		
Oct.					Corr.	Corr.*		
21st	8 A. M.	79.0	30.88	30.03	29.75	30.01	N. E.	} Moderate breeze and cloudy. Very gloomy and threatening all round with passing squalls from the eastward.
	2 P. M.	80.	30.78	30.02	29.73	30.00	Ditto.	
	8 P. M.	80.	30.76	30.02	29.73	30.00	Easterly.	
22nd	6 A. M.	79.5	30.68	29.92	29.60	29.90	East.	Squalls, with thick hazy weather.
	8	79.5	30.74	29.97	29.68	29.92	Ditto.	Ditto ditto.
	10	79.5	30.74	30.00	29.68	29.93	Ditto.	Ditto ditto.
	12 Noon.	78.5	30.70	29.95	29.66	29.90	Ditto.	Much rain, very hazy.
	2 P. M.	78.0	30.62	29.90	29.60	29.86	N. E.	} Hard squalls with much rain. Gale commenced. Gale, hard gusts.
	4	78.0	30.60	29.85	29.57	29.81	E. N. E.	
	6	78.5	30.58	29.82	29.54	29.78	S. S. E.	
	8	79.4	30.55	29.82	29.53	29.79	Ditto.	

\* Mr. Bedford's table is given as it reached me to allow of the comparison with the Sympiesometer. To compare his Barometer with others, the corrections marked must be made. I regret being unable to give his valuable projection but I shall use it in another place.—H. P.



<i>Date.</i>	<i>Hour.</i>	<i>Ther.</i>	<i>Symp.</i>	<i>Aneroid.</i>	<i>Cald- rara Bar.</i>	<i>T. and Simms Bar.</i>	<i>Wind.</i>	<i>Remarks.</i>
23rd	10	79.8	30.50	29.80	29.50	29.76	E. S. E.	Hurricane with oc- casional lulls, spit- ting rain with heavy scud.
	12	80.0	30.44	29.72	29.45	29.70	East.	
	1 A. M.	79.8	30.38	29.66	29.39	29.62	Ditto.	
	2	79.5	30.32	29.60	29.32	29.56	E. b. S.	
	3	79.2	30.24	29.51	29.25	29.47	Ditto.	From 4 to 6 was the hardest part of the hurricane, it was screaming the most fearful note I ever heard. Vessel often with her lee rail under water, <i>gradually</i> pressed down by force of wind only, lower masts bending like twigs, sky and water mixed, form- ing a mad boiling surge in which we were helpless. At 7 it moderated for a short interval A Sudden shift, and blew as hard as ever. Slightly moderat- ing. Much more mo- derate. Ditto ditto. Close reefed, topsail breeze. Sea going down fast Fresh breeze. Ditto and clear. More moderate. Clearing away fast. Moderate breeze and fine. Ditto ditto.
	4	79.0	30.08	29.40	29.14	29.34	E. S. E.	
	5	79.0	29.88	29.18	28.94	29.18	Ditto.	
	6	79.0	29.56	28.80	28.60	28.78	Ditto.	
	7	79.0	29.52	28.85	28.65	28.81	Ditto.	
	8	79.0	29.73	28.92	28.70	28.92	North.	
	9	78.8	30.05	29.30	29.06	29.32	N. N. E.	
	10	78.5	30.28	29.56	29.25	29.50	Ditto.	
	11	78.5	30.40	29.62	29.35	29.60	N. N. W.	
	12 Noon.	78.0	30.47	29.68	29.39	29.63	Ditto.	
	1 P. M.	78.0	30.50	29.70	29.43	29.66	N. W.	
	2	78.0	30.53	29.72	29.45	29.70	NW b. W.	
	3	77.7	30.53	29.76	29.47	29.71	N. W.	
	4	78.0	30.55	29.78	29.48	29.73	Ditto.	
	5	78.3	30.58	29.80	29.49	29.77	W. N. W.	
	6	78.2	30.62	29.82	29.53	29.80	West.	
	8	78.0	30.62	29.85	29.58	29.83	Ditto.	

The vessel's position when the above were taken, was about  $1\frac{1}{2}$  miles S. W. of Mud Point, they were all either taken, or their accuracy ascertained by myself. Some latitude must however be given for the direction of the wind which I found difficult to obtain, except when it was right ahead. I do not think the error would amount to more than one or two points.

The projection of the above register would seem to shew that the Aneroid will bear a very fair comparison with the Sympiesometer in these gales, both in its range and sensitiveness it was when first received regulated by the standard Barometer at the Surveyor General's Office. The Sympiesometer, you may observe, is a very high one.

A. BEDFORD,  
*River Surveyor, Commdg. Megna Steam Vessel.*

*Abridged Log of H. M. S. Fox, Commodore G. LAMBERT, lying at Diamond Harbour.—Civil Time.*

22nd Oct.—A. M. overcast, showery and gloomy. Wind Easterly (3).\* 8 A. M. (2) the same weather, Bar. corrected 29.805; Noon 29.715; Ther. 70°. P. M. wind easterly (6) weather as before; 5 P. M. Bar. 29.685; Ther. 80°; 6 P. M. wind S. easterly (7); 8 P. M. east (9). Overcast, squally, rain, and thunder and lightning; midnight the same force (10); Bar. 29.585; Ther. 79°.

23rd Oct.—A. M. rain, squally and thick weather. Wind E. S. E.; force (10) to (11) and (10) again at 4 A. M. Bar. at 1h. A. M. 29.555; at 2h. 29.535; at 3h. 29.485; at 4h. 455; 2 A. M. down top gallant masts, and at 7 A. M. pointed yards to the wind, ugly weather; veered to 80 fs. cable. At 8 A. M. wind N. E. (10) Bar. 29.385; at 9h. 29.375; at 10h. 29.375; at 11h. 29.435; at Noon 29.455; Ther. 78°; at 10 A. M. wind North (10); Noon N. N. W. (10); P. M. N. W. b. N. (9). Overcast, misty, gloomy, and rain; at 4h. N. W. b. N. (3); at 6, N. W. b. N. (6). Bar. at 2 P. M. 29.505; at 4h. 29.555; at 6h. 29.635; at 8h. 29.655; at midnight 29.705. Clear and cloudy.

*The following are my own observations at Calcutta, the Barometer being corrected to that of the Surveyor General's Office but with no correction for Temperature, &c.*

Wednesday, 22nd Oct. 1851.—For the last two days weather suspicious with light drizzling showers; heavy overcast sky, breaking at times into clear blue spaces, varied by cirri and cirro-strati

21st Oct.—Wind in light squalls and puffs from N. to N. E. scud from East and N. East.

22nd Oct.—At 6½ A. M. light squally breezes and puffs N. to N. N. E. and N. N. W. Scud thick and frequent, and a low smoky scud below all from the N. East, driving moderately, but not very fast, Bar. 29.859; Symp. 29.95; Ther. 79°. Scud at times from the S. E. and arched squalls, with very little wind in them, from the Eastward.

9 A. M. Bar. 29.959; Symp. 30.00; Ther. 79°. Calm. Heavy banks to S. E. and South.

5 P. M. squally breeze from N. East with light rain. Sky overcast, low smoky scud, travelling rather rapidly from N. E.; heavy rain. Bar. 29.829; Symp. 29.90; 6h. 10' P. M. the same as at 5 P. M.; 7h. P. M. Bar. 29.819; Symp. 29.91. Ther. 79°.

23rd Oct.—6 A. M. Bar. 29.719; Symp. 29.83; Ther. 78¼°. Blowing a fresh steady gale from E. N. E. to N. E. with continued rain during the night, wind and rain gradually increasing. Scud from E. b. S. and E. S. E. ½ p.; 8 A. M. gale force (3—9) E. N. E. to E. b. N. strong squalls and rain. Scud from about East.

\* Force by Admiral Beaufort's scale. The Barometer is corrected by a careful comparison with the standard giving —0.015 as the correction.

9h.15' A. M. Bar. 29.679; Symp. 29.80; Ther. 78°. Wind N. E. (8—9). Squalls strong (9—10). Scud from N. East! 10h.15' A. M. Bar. 29.579; Symp. 29.78; Ther. 78°.

11h.15' Bar. 29.629; Symp. 29.78; Ther. 78½°; Noon Bar. 29.639; Symp. 29.77; Ther. 78½°. Squalls less severe and less rain with more light at times; clouds more in masses. Wind N. b. E.! Scud from N. East.

1 P. M. Bar. 29.629; Symp. 29.76; Ther. 78½°. Scud from N. N. E. Wind North and N. b. W.

2 P. M. Bar. 29.609; Symp. 29.76. Scud from N. b. E. Wind North to N. W.!

3 P. M. Bar. 29.619; Symp. 29.78; Ther. 78½°. Wind much abated and N. N. W. to N. W. but the scud still from N. b. E. Clouds darker but less rain.

4 P. M. Bar. 29.629; Symp. 29.79; Ther. 78½°. Scud from North. Wind N. W. to N. N. W.\*

7 P. M. wind about N. W. and in slight squalls only, Bar. 29.739; Symp. 29.85; Ther. 78°.

#### SURVEYOR GENERAL'S OFFICE.

*The following table is extracted from the monthly register kept at the Surveyor General's Office. Bar. corrected to 32° Fahr.*

#### TIME OF OBSERVATION.

Date.	Sunrise.		9 h. 50 m.		Noon.		2.40 P. M.		4 h. P. M.		Sunset.	
	Barometer.	Thermometer.	Barometer.	Thermometer.	Barometer.	Thermometer.	Barometer.	Thermometer.	Barometer.	Thermometer.	Barometer.	Thermometer.
1850												
Oct.		0		0		0		0		0		0
19th	29.868	78.3	.922	83.6	.863	85.0	.793	84.0	.806	81.2	.831	79.0
20th	.849	77.4	.884	80.6	.819	82.6	.853	79.0	.751	79.2	.759	78.6
21st	.777	76.6	.819	81.3	.776	77.8	.719	78.5	.710	80.0	.722	79.0
22nd	.752	76.8	.806	78.7	.765	75.5	.692	75.3	.667	76.2	.663	76.2†
23rd	.564	76.0	.520	70.6	.475	76.6	.488	78.0	.515	77.6	.555	78.0
24th	.705	75.6	.771	80.0	.730	83.0	.662	86.0	.668	85.8	.679	83.8
25th	.791	77.8	.863	84.3	.819	86.2	.771	87.4	.764	86.3	.812	83.8

\* These are the same points as in the preceding entry, but the order of them is designedly changed to express that *generally* the wind was from the first point or N. W., but at times, either from incurving or from the eddies over a town, veering to N. N. W.: so in the entry at 3 P. M. N. N. W. to N. W. means that generally the wind was N. N. W., but at times N. West.

† Fall of rain nearly 12 inches.

*Substance of letters from Noacolly in Lat. 22.53' N. Long. 90.54' East. Communicated by Dr. BAKER.*

No. 1. "We have had one of the most severe hurricanes that has been known here since 1829. It commenced about 6 o'clock on the evening of the 23rd; increasing till midnight when it blew a complete hurricane until 5 A. M. of the 24th; the damage done and loss of life is said to be very great. It commenced from the S. E. passed on the South and terminated with the wind at S. W.

No. 2. "Hatteah and Sundee\* have escaped pretty well, but Siddee (an island between Sundee and the mainland) and Bouring on the mainland have suffered considerably in crops, cattle and some loss of inhabitants.

No. 3. "Since my last I have seen a letter from Chittagong. The gale was much more moderate at that place. They had very high tides and squally weather, not amounting to a gale, on the 23rd and 24th. Accounts from Noacolly continue to add to those received of the devastations of the Cyclone in that quarter. The loss of human life is very great. Nearly two hundred corpses were counted in the creek leading up to the station. They had floated up with the tide, with numbers of cattle, deer, tigers, buffaloes, &c."

CHITTAGONG.

*Letter from A. SCONCE, Esq., C. S., Judge of Chittagong.*

"In case no account of our Chittagong weather during the late Cyclone may have reached you, perhaps my notes may be acceptable.

"The weather being previously fine, a change was first observable on the afternoon and evening of the 18th Oct.; there was a heavy, dirty looking bank to Southward. At night it rained; rained almost all the 19th lightly; with little wind S. to S. E. 21st and 22nd overcast with clouds: air still or nearly so; on 23rd wind at S. E. Morning and forenoon, heavy clouds rising W. and S. W. veering to N.; at noon heavy in the N. W. and thundering.† From 1 to 3 P. M. wind S. to S. E. squally with rain; evening squalls heavier: before midnight, wind rose; blew very strong (apparently) S. E. perhaps nearer E. then to S. and so far as I could observe from 4 A. M. of 24th veered round to S. W.; at 6 A. M. of the 24th blew strong from S. W.; at breakfast, wind began to fall. On the 23rd, 3.18 inches rain fell. My Barometer being broken, I can give no account of it.

\* Islands at the mouth of the Burrampooter.

† This is worthy of note.—H. P.

"The only point which this statement may be found perhaps usefully to illustrate is this, that the gale or Cyclone took 24 hours to come from Kedgerie to Chittagong. The *Precursor* had it on the night of Wednesday, we had it on the night of Thursday."

*Extract of a letter from E. CRASTER, Esq. Acting Collector of Chittagong.*

"The weather for some days previous to the 23rd Oct. had been gloomy and threatening with occasional falls of rain, not, however, in any great quantity, the Southern horizon in particular continuing overcast with a mass of heavy leaden-coloured clouds; and men of experience on the coast predicted the occurrence of a gale, fixing the probable period as about that of the change of the moon.

On Thursday the 23rd Oct. the wind blew pretty fresh throughout the day from the Southward, gradually increasing as the evening closed in, rain also fell occasionally, but more in the form of driving mist, than that of actual rain.

About 10 p. m. the wind freshened up suddenly from about S. E. by South, and at that point the gale commenced, accompanied with a heavy fall of rain; it continued increasing in violence until about 2 a. m.; when it appeared to have attained its height, the direction of the wind gradually changing from the point at which the gale commenced, and drawing round by South towards West, from which last quarter it was blowing hard at 7 a. m.; after this time the gale abated; a moderate breeze from the North-West continuing throughout the day. The quantity of rain which fell during the gale was 3 inches 23 cent."

In a subsequent letter, in reply to some enquiries, Mr. Craster informs me that the Master Attendant's Barometers were at about 29.50. And he confirms also the foregoing accounts of the devastations occasioned by the high tide (Storm Wave?) along the Eastern shore of the Burrampooter; he says that three hundred persons and thousands of cattle are reported to have been drowned.

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I now give for the purposes of ready comparison as usual, the comparative table of winds and weather with the different vessels and at the shore stations.

*Comparative Table of Winds and Weather from the 20th to the 24th October 1851. Precursor's Cyclone.*

<i>Date.</i>	<i>Name of Ship or Station.</i>	<i>Lat. N.</i>	<i>Long. East.</i>	<i>Winds and Weather.</i>	<i>Bar.</i>	<i>Symp.</i>	<i>Ther.</i>	<i>Remarks.</i>
1851. 20th Oct.	Ararat.....	16.28	86.58	Strong breezes and squalls, from West and South, increasing fast.	29.75 2 P.M. 67.	..	84	Barometer on the 19th 29.85. Rearward sea of the Cyclone at Noon from the N. W. 1.30 P. M. bore to, midnight hard gale.
	Esaurain.....	15.25	91.56	P. M. moderate S. E. breeze and fine, moderate	29.15 29.30	..	..	Heavy S. W. swell.
	Georgina.....	21.4	88.40	8 A. M. Threatening to the S. E., Noon moderate, P. M. light squalls.	29.92 29.89	29.55 to 29.40	87 to 89	At anchor, and standing to Sea from the Sand Heads. Hunk to S. E. with lightning.
	Schr. Orissa, Balasore River.....	21.28	87.12	Cloudy. Wind S. E.	29.66 falling.	..	..	Ran in to Balasore River for shelter.
	Lucknow; standing to sea .....	20.40	87.54	A. M. E. S. E. P. M. East, 10 P. M. N. E. increasing breeze.	..	..	..	Standing to the S. S. W. and South.
	H. C. P. V. Tavoy.	Eastern Channel. 20.4	88.27	E. S. E. Increasing breezes with heavy squalls and rain.	29.96 to 29.87	79½ to 81	..	Sea beginning to rise.

Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Symp.	Ther.	Remarks.
21st Oct.	Ararat.....	17.6	87.50	South at 5 A. M. S. S. W. again at Noon. P. M. S. S. W. to midnight when hard gale and squalls about South.	29.70	..	84	Ship running 8 to 10 knots to the North breaking up at 4 A. M.
	Easurain.....	17.4	90.33	Wind S. E. 7 and 8 knot breeze, P. M. South.	..	Bar. 29.93 5 P. M. 95. 6h. 88 8h. 90 Mid. 88.	86	Very heavy S. W. swell. P. M. dangerous, cross sea W. N. W. to S. W.
	Lord Petre.....	19.20	89.54	S. W. and S. b. E. A. M. squally; midnight strong gales.	A. M. 29.86 P. M. .90 Mid. .86	..	78. to 77.	4 P. M. hove to, dark squally weather.
	Georgina.....	21.60	88.30	E. S. E. and S. E. b E. breeze increasing throughout.	29.84 to 29.56	29.35 to 29.15	89	Barometer very unsteady, 10 A. M. suspicious to the Eastward and Southward. Standing to the S. W., clear over head, wild looking weather, heavy head sea from S. E. and S. W.; lightning.
	False Point Light House..	20.19½	86.59	Winds N. N. E., East and N. E. cloudy, light rain, heavy squalls increased to a strong gale.	..	29.85 to 29.50	..	Hazy; appearance of a gale. Scuds from N. E. and S. East crossing.
	Schooner Orissa, Balasore River.	21.28	87.12	Wind E. S. E. squally	29.60	..	..	No indications of a storm, but tide 2 hours in advance.

21st Oct. Brig Scourfield Pilot Station. ..	..	..	Fresh S. Easterly breeze and squally.	..	..	..	Heavy swell from the Southward at night.
Lucknow.....	19.9	87.43	2 A. M. strong gales N. E. increasing to Noon. P. M. wind had veered to N. W. at 8 P. M. S. W. Midnight stiff gales.	..	..	..	2 A. M. heavy sea from the Southward; 10 A. M. hove to, running to the S. and S. W. till that time, 6 P. M. modera- ting.
H. C. P. V. Cavery	Proceeding down and to Sea.		E. b. S. to S. E. b. S. 11 A. M. S. E. b. S. Midnight E. S. E.	29.99 to 29.95	..	..	Lightning N. E. to N. W. at 8 P. M.
H. C. P. V. Tavoy.	Eastern Channel. 21.4	88.27	Blowing hard E. S. E. to S. E. gusty and un- steady and at times S. S. E.	29.84 to 29.80	..	81 to 81.30	Atmosphere dark and gloomy. Signs of warm wea- ther.
H. C. F. L. V. Hope	Saugor Point. Station. 21.26	..	A. M. moderate N. E., and increasing. Noon East; 4 P. M. strong S. S. E. winds 8 P. M. blowing hard S. E. b. S. Midnight heavy gale S. S. E.	29.824 to 29.80 and 29.75	..	81 to 80	8 P. M. heavy squalls thunder, lightning and rain.
Virginie.....	Saugor Roads.	..	Fresh breeze E. b. N. to E. S. E.	29.75 to 29.66	..	..	At Anchor.
H. C. B. V. Grap- pler.....	Kedgera. 21.52	.. 87.59	N. E. to East with squalls and rain. Latter part East to S. E. hard squalls.	29.88 to 29.85	..	..	.....



Date.	Name of Ship or Station.	Lat. N.	Long. East.	Winds and Weather.	Bar.	Symp.	Ther.	Remarks.
21st Oct.	H. C. Surveying Brig Megna.	Mud Point. 21.56	88.07	N. East and Easterly.	30.03 to 30.02	..	..	Gloomy and threatening from the Eastward with pass- ing squalls.
	At CALCUTTA....	22.35	88.21	Wind in light squalls and puffs N. to N. E.	..	..	..	Scud from East and N. E.
22d Oct.	Ararat.....	19.18	88.2	South at 10 A. M., in- creasing. Noon hard gale; P. M. S. W. b. S. hard gale, to midnight.	29.66	..	87	Running up till daylight when hove to again. Dense black bank to the Westward.
	Esaurin.....	19.38	89.55	Strong gales South; 4 A. M. 29.89 P. M. S. S. W. mid. 6 night hard gales S. S. W. 8 Noon .90 Mid. .88 S. W. .85	29.89 .86 .90 .88 .85	..	86	Cross sea threatening to W. S. W. Current to S. E. b. E. 16'. 4 P. M. hove to. Tremendous sea, S. W. to West.
	Lord Petre.....	20.02	89.20	Wind S. b. E. to S. b. W. throughout; to 8 A. M. strong gales. Noon P. M. more moderate, P. M. Strong gales.	29.78 { A. M. { .80 P. M. .70	..	..	Squalls and much light- ning.
	Georgina.....	..	..	4 A. M. very severe gale S. S. E. Noon S. W. b. S. P. M. S. W. b. S. midnight S. W.	29.53 to .48 and .69	29.10 to .04 and .25	86 to 84	10 A. M. severe squall, ship on her beam ends; wind veered to S. W. Noon in 35 ft. wa- ter. Midnight violent squalls and tremendous sea.

22 Oct False Point Light House.....	20.39	86.59	2 A. M. E. N. E. 4 East 5 S. E. 7.30 rain; 9.30 complete hurricane at South; Noon S. W. 3 P. M. West.	29.45 to 28.50 and 29.70	..	2.30 A. M. sea made a complete breach up to the light house, 3 P. M. gale broke.
Schooner Orissa, Balsore River.	21.28	87.12	Wind East and E. N. E. 3 P. M. E. N. E. to N. E. 6 N. E. to N. N. W. 9 P. M. N. W. to West.	29.50 P. M. 29.55 29.45 .40 .20 .10	..	Gale from 4 P. M. to 3 A. M. 23rd.
Scourfield; Pilot Station and at sea.	..	..	Blowing hard from S. East with roaring gusts daylight hard gale, midnight moderate.	29.70 to 29.60 .50	..	Daylight put to sea 4 P. M. on her beam ends, cut away masts and anchored.
Lucknow.....	17.44	87.30	A. M. stiff gale S. W. E. S. E.; 2.30, oscillating from E. S. E. to S. E. till 2 P. M. when veered to S. S. W. 8 P. M. wind hauling to Westward, midnight moderate at W. S. W.	.. 29.69 to 29.30 and 29.80	..	..... Heavy hurricane, E. S. E. to S. S. W. 4 P. M. Bar. began to rise.
H. C. P. V. Cavery. In 20 fs. to S. W. of station and at anchor about 20.44	..	87.20	Increasing gale. Noon a heavy gale; P. M. severe E. S. E. to South, Noon to 8 P. M. when S. S. W. to midnight.	29.76 to 29.53 and 29.55	81. to 80.	Very high sea from S. E. Noon breaking dangerously, P. M. tremendous cross sea, rain in sheets. Extraordinary flashes of light S. E. and N. E.
H. C. P. V. Tavoy. Eastern 21.4 Channel. 88.27	..	..	..	..	..	..

<i>Date.</i>	<i>Name of Ship or Station.</i>	<i>Lat. N.</i>	<i>Long. East.</i>	<i>Winds and Weather.</i>	<i>Bar.</i>	<i>Symp.</i>	<i>Ther.</i>	<i>Remarks.</i>
22d Oct.	H. C. F. L. V. Hope. ....	Saugor Point Station.	..	Strong S. S. E. gales to Noon; increasing to hurricane at sunset. 8 P. M. S. S. E., midnight the same. Hurricane.	29.83 to 29.10	80 to 75	..	Heavy squalls and sea throughout.
	Virginie.....	Saugor Roads.	..	S. E. to S. E. b. E.	29.68 to 29.30	..	..	Sunset heavy banks to South 11 P. M. hurricane 11.40 cut away masts.
	P. and O. Str. Precursor.....	Kedgeres. 21.52	87.59	9.45 wind E. S. E. heavy rain and thick windy weather. Noon E. S. E. to S. E. 4 P. M. E. S. E. midnight S. E. to S. S. E. hard gale.	29.90 to 29.28	80 to 78	..	From 8 P. M. to midnight, gale increasing fast.
	H. C. B. V. Grappler.....	Kedgeres.	..	A. M. hard squalls from Eastward to 7 A. M., squalls and thick rain E. N. E. to S. E. To midnight, severe gales.	29.85 to 29.55	..	..	Hard squalls of dense thick rain.
	H. C. Surv. Brig Magna.....	Mud Point. 21.56	88.07	East to Noon then N. E., E. N. E. and S. S. E. and at 10 P. M. E. S. E. to East, hurricane.	29.92 to 29.72	..	..	Weather increasing gradually to hurricane; gale commenced at 6 P. M.

22d Oct.	H. M. S. Fox....	Diamond	Harbour.	Wind	Easterly (3.) P. M. the same (6.) 8 P. M. East (9.) Mid- night East (10.)	29.80 29.71 and 29.56	..	79.	Gloomy squally weather throughout with thunder and lightning at 8 P. M.
	AT CALCUTTA....	..	..	6 A. M. light squalls and puffs N. to N. E. and N. N. W. 8 P. M. squally breeze from N. E.	29.86 to 29.96 and 29.82	29.95 to 30.00 and 29.91	..	79.	Scud thick and frequent, and a low smoky scud below all from N. E.
23rd Oct.	Ararat.....	19.30	88.5	9 A. M. S. S. W. Noon hard gale; 3 P. M. W. S. W. b. W. 6 P. M. W. S. W. moderating.	29.68	..	..	86.	.....
	Esaurin.....	20.11	89.41	Daylight hard gale S. S. W. to S. S. W. the same throughout.	4 A. M. 29.84 Noon .85 2 P. M. .80 6 .76	..	..	84.	Lying to. Sunset, remark- able red sky to Westward.
	Lord Petre.....	20.29	89.14	Wind S. b. W. to W. S. W. 6 A. M. Hurri- cane till 9 A. M. Noon fresh gale.	{ 29.70 to .74 to .78	..	..	..	Midnight dark squally ap- pearance to the S. W. with much lightning.
	Georgina.....	25 miles S. of Floating light.	..	A. M. gale appears broken, wind S. W., Noon moderate.	29.68 to 29.81	..	..	..	8 P. M. lightning to the westward, midnight squalls, rain and thunder and light- ning to the eastward.
	FALSE POINT LIGHT House.....	20.19½	86.59	Wind West and fine weather.	29.70 to 29.72	..	..	..	.....

<i>Date.</i>	<i>Name of Ship or Station.</i>	<i>Lat. N.</i>	<i>Long. East.</i>	<i>Winds and Weather.</i>	<i>Bar.</i>	<i>Symp.</i>	<i>Ther.</i>	<i>Remarks.</i>
23d Oct.	H. C. P. V. Cavery	20.44	87.20	Variable West to N. N. W.	29.90	..	..	Towards morning much lightning to the S. W.
	H. C. P. V. Tavy.	Eastern Channel. 21.4	88.27	To 4 A. M. severe gale and S. W. wind to 8 A. M. when W. S. W.; at 10. West at Noon; W. N. W. at 2, and N. W. at 8 P. M.	..	..	..	Severest part of gale from 4 P. M. 22nd to 4 A. M. 23rd
	H. C. F. L. V. Hope .....	Saugor Point Station.		A. M. hurricane S. S. E. 8 A. M. hurricane shifted to the Westward with terrific squalls.	29.10 to 28.33	..	..	1 A. M. Vessel on her beam ends and driving 8 P. M., grounded.
	Virginie.....	Saugor Roads.		1 A. M. South 2 S. S. W.; 3 West; 6 W. N. W.; 7 N. W. Noon North 2 N. b. E.; 5 N. N. E.; 8 East. 9 S. East to daylight. Hurricane but steady, 6. A. M. moderating to severe gale.	29.14 to 28.65 and 29.57	..	..	Midnight wind terrific. Nearly foundering; daylight bright glaring patches in sky.
	P. and O. S. N. Comp.'s Str. Precursor. ....	Kedgeres.	..	Wind steady at S. S. E. to 4.30 A. M. when lulled; at 5, shift from N. N. E. to N. West.	28.83 to 29.91	..	78. to 82.	2 A. M. terrific hurricane; 4 A. M. grounded, 9 A. M. wind lulled and continued moderate at N. W.

23d Oct.	H. C. B. V. Grap- pler.	Kedgeres.	..	2 Gale from S. E. to E. N. E. increasing every moment; 4 hurricane, 6. A. M. moderating and veering to the Northward and again suddenly bursting out from N. N. W. At 9.30 had veered to W. N. W. always mo- derating 4 P. M. fresh N. West and breeze. 1 A. M. East; 2 E. b. S.; 4, E. S. E. At 8. shift to North; 9, N. N. E.; at 11, N. N. W.; 1 P. M. N. W.; 5, W. N. W.; at 8, West.	29.89 to 29.03 and 29.74	..	..	.....
	H. C. Surv. Brig Megua.	Mud Point.	..	1 A. M. East; 2 E. b. S.; 4, E. S. E. At 8. shift to North; 9, N. N. E.; at 11, N. N. W.; 1 P. M. N. W.; 5, W. N. W.; at 8, West.	29.64 to 28.80 and 29.85	..	80. to 78.	Hurricane heaviest from 4 to 6 A. M. At 7 A. M. mo- derating before the shift at 8 A. M.
	H. M. S. Fox.....	Diamond Harbour.	..	A. M. E. S. E. (10). (11) and (10) at 4 A. M.; 8 A. M. N. E. Noon N. N. W. (10) P. M. N. W. b. N. (9); 4 N. W. b. N. (8). At 6 (6). 6 A. M. fresh steady gale E. N. E. to N. E. with continued rain du- ring the night. Increas- ing to 8 A. M. when gale (8-9) E. N. E. to E. b. N.; squalls (9-10). Noon N. b. E.; 1 P. M. North; 3 N. N. W. to N. W. much abated. 7 P. M. N. W. slight squalls.	29.55 to 29.37 and 29.70	..	..	Rain, squalls and thick weather throughout till mid- night, when clear and cloudy.
	AT CALCUTTA.....	..	..	29.72 to 61 29.64 and 29.74	29.83 to 29.76 and 29.85	78.	Scud from E. b. S. and E. S. E. 8 A. M. from East. Noon less severe; scud from N. East.	

The Noacolly and Chittagong reports not being simultaneous with these, are not added to the table.

## SUMMARY.

I proceed now to detail the grounds on which I have delineated the remarkable track of this very interesting Cyclone, which is distinctly an instance of the recurving of a track at the head of the Bay, and to shew its rate of travelling and other peculiarities.

The *Ararat's* Log is the first to consider, and we find her running up towards the Sand Heads on the 18th and to Noon of the 19th with a smart monsoon breeze and latterly sharp squalls, being at Noon in Lat.  $13^{\circ} 50'$  N.; Long.  $\Lambda. M.$   $87^{\circ} 11'$  East; Bar. at 29.81; Ther.  $84^{\circ}$  this weather increased to midnight; the wind however still at S. b. W.

On the 20th of Oct.—The squalls are stated to come from “about West;” at 3  $\Lambda. M.$ , though the wind is marked S. b. W. and South; at 11  $\Lambda. M.$  and at 10.30, the squalls are said to be S. W. veering to S. b. W. At Noon she was in Lat. by Acct.  $16^{\circ} 28'$  N.; Long.  $86^{\circ} 58'$  East; her Bar. having fallen a little, and this with the heavy appearance and a very heavy sea from the W. N. W. induced Capt. Ritchie, very properly, to heave to at 1 P. M. When hove to in Lat.  $16^{\circ} 35'$  N. Long.  $86^{\circ} 58'$  E. he had the wind S. S. W. and the Barometer still falling, being at 29.67 at 2 P. M. Unfortunately the continuous observations of the Barometer, though it was evidently carefully watched, are not registered. At midnight on this day it was blowing a hard gale with torrents of rain. The *Easurain* four degrees to the Eastward of the *Ararat* had nothing but a heavy swell, and the *Georgina* and *Tavoy* at the Pilot station, or  $4\frac{1}{2}$  degrees to the North of the *Ararat*, had increasing breezes from the E. S. E. and the sea beginning to rise. The *Lucknow* which ship had just left her Pilot, and was some twenty miles to the South of the station, had also the sea beginning to rise with the wind at N. East.

From these data, we should at first say that, if the Cyclone was at all in action on this day, its centre would be somewhere between the position of the *Ararat* and Vizagapatam; but from her subsequent run and her Barometer on the 21st, together with the winds experienced by the other ships, there was nothing at the earth's

surface on this day beyond a strong remnant of the monsoon. I say here "at the earth's surface" because I think it quite probable that the Cyclone may have been formed and in action overhead, and not far from the *Ararat's* position, though it had not yet descended.

*On the 21st Oct.*—We have the *Ararat* bearing up at 5 A. M. with the wind at South, and running up to the N. N. W. with a fine breeze at Noon, when she again had it S. S. W. and by sunset it increased to hard squalls; at midnight it was a hard gale with which she was running 10 knots, being then at midnight in  $18^{\circ} 35'$  N. and Long.  $87^{\circ} 23'$  East with the wind about S. b. W. veering to South at 3 A. M. on the 22nd. We have also for this day the *Lucknow's* log, which ship on the 21st, at noon had a heavy gale which had veered from N. E. to W. N. W. as she ran down and hove to, showing that she was on the Western side of her Cyclone, while the *Lord Petre* in nearly the same latitude but 130 miles to the Eastward of her, was hove to with a heavy Southerly gale showing that she was on the Eastern side of it. To the Northward, the *Georgina* just leaving her pilot, found the weather becoming worse, with more suspicious appearances as she stood to the S. W., her Barometer being unsteady and the sea coming up from the S. East. The Pilot vessel *Tavoy* and the ship *Scourfield*, at the pilot station had it blowing fresh, and with the *Tavoy* hard, from E. S. E. to S. East, though the *Tavoy's* Barometer was yet 29.84 to 29.80.

From this it appears clear that there were *two* Cyclones formed on the 21st, both travelling up on tracks between North and N. N. W. the Western one of which passed over the Light House at False Point; at 8 A. M. on the 22nd, being at Noon on the 21st between the *Ararat* and the shore; its centre lying then in about Lat.  $17^{\circ} 30'$  N. and nearly on the meridian of the Light House at 176 miles distant from it, and this Cyclone we may, to distinguish it, call the Light House Cyclone. The other, or Eastern one, I consider to have its centre between the tracks of the *Lucknow* and the *Lord Petre* or between the meridians of  $88^{\circ}$  and  $90^{\circ}$ , its centre being at Noon, also on the 21st, in about  $19^{\circ} 12'$  North and, say, 118 miles S. S. E. of the Floating Light Vessel station. The heavy Southerly gales of the *Ararat* may, it is true, have been, for a time at least, the remainder of the monsoon, but there seems no reason to doubt that, if not



from the first forming the Eastern quadrants of a Cyclone, they finally were so, beyond question. There is nothing extraordinary in this instance of Cyclones occurring about the same time, and traveling up on parallel tracks,\* as those who have paid attention to the progress of Cyclonology well know.

*On the 22nd of Oct.*—Following, first, the Light House Cyclone: We find the *Ararat's* Southerly gale still continuing and increasing so much that at daylight, she very properly hove to again. She notes at this time, and this is of much interest "a dense black bank to the Westward" and this, I consider to have been indubitably the body of this Cyclone. At noon she was in Lat.  $19^{\circ} 16' N.$ ; Long.  $88^{\circ} 2' East$  or 88 miles S. East of False Point Light House, where the centre, preceded by the storm wave at 2h. 30' A. M. wind then E. N. E. had already passed from 7h. 30' to 9h. 30' or say 8 A. M. and the gale from E. N. E. had shifted and veered to S. W. At Noon we find the *Ararat* had the wind at South, according to her log, in which it is only entered at 3 A. M. but as she was, while lying to, coming up to S. E. it is clear the wind was at least S. W. b. S. at times with her. She had hove to at 8 A. M. and if we take her drift to have been three miles per hour to the Northward, this will place her at 8 A. M. in about Lat.  $19^{\circ} 06' N.$  and the Long. as before  $88^{\circ} 02' East$ , with the Light House bearing N.  $43^{\circ}$  West.

And we must take this position and the Light House report, on which the fullest dependence can be placed, to fix the centre of this Cyclone there for this day, and a circle with its centre at the Light House as at 8 A. M. instead of at Noon, and the Cyclone circles extending to the position of the *Lord Petre* and *Lucknow* nearly agrees with their winds, allowing for some little incurving, so that at this time the two Cyclones of the 21st had united? from which we may deduce that the Eastern one was travelling over to the Westward, and that it was probably at their junction that the American ship *Portsmouth* was dismasted. The log of this ship will be found in the summary.

We farther find that from 8 A. M. to Noon this day, the Cyclone at the Light House had recommenced blowing "a complete hurri-

\* See for a remarkable instance of them in this very locality and also in the month of October, the Ninth Memoir, Journ. As. Soc. Vol. XII. p. 771.

cane" at South, and that at Noon it was S. W. and began to break at 3 P. M. with the wind at West.

Now if we trace this track, i. e. wind East at 3 A. M. and S. E. at 5, calm at 7.30 to 9.30 or say the centre passing at 8 A. M., then renewing at South at 10 and becoming S. W. at Noon as just described we shall find that with proper allowances for its probable distance as shewn by the Barometer, this gives a track curving to the N. N. East, the actual centre of the calm space being inland, a few miles West of the Light House at 10 A. M. I need not say that the fullest confidence is to be accorded to Mr. Barckley's careful observations.

At Noon we have the gale commencing only at E. N. E. with the H. C. Schooner *Orissa* in Balasore Roads, where we have also fortunately in Mr. Bond, the Master Attendant, another excellent observer. It passed up to the Eastward of that station, veering gradually to the N. E. and becoming "a gale;" at 4 P. M. We should have expected it to have begun earlier here, and I can only account for this anomaly by the fact that the Northern and North Western quadrants of the Cyclone, when the centre reached False Point, extended to the range of high hills (from 2000 to 2500 feet high) called the Balasore Nilgherries, which form one of the Eastern extremities of the great Vindhya chain. These lie inland about 25 miles from that station, and may have occasioned the Cyclone to lift up in that quarter for a time, and indeed to have turned off to the North East, as we see it has done. At the Pilot station it was now a heavy gale at South, and these winds will place the centre in Balasore Roads in about Lat.  $21^{\circ} 05'$ ; Long.  $87^{\circ} 40'$  East. We have, it is true, also the logs of the *Georgina* and *Cavery*, but as these vessels were drifting with the hurricane and their positions uncertain, and both in distress; the *Georgina* indeed at some distance to the S. East in 35 fathoms water, I have not used them.\*

*October 23rd.*—The next positions we have for the centre are from the log of the P. and O. Steam Vessel *Precursor* and the H. C. Buoy Vessel *Grappler* at Kedgerree; where it fell calm at 4h. 30'

\* The *Cavery* was found after the gale to be at an anchor in 9 fs. off the Reef of Point Palmiras, but even the time on board of this vessel was not well ascertained in her distressed condition, as I afterwards learned.

A. M. with the first vessel, which was then on shore close to Cowcolly light, and at 6 A. M. moderated and veered to the Northward with the *Grappler*, which vessel appears to have been at some little distance from the *Precursor*, but not far enough to account for this discrepancy, which we must therefore attribute to those errors in the estimates of the time usually made when the log is written up from recollection as it always is in these cases I suppose ? unless on board of Men-of-war, or where there is a scientific officer on board who is carefully observing while others are carrying on the ship's duties as in the case of the *Megna* Surveying Vessel with Mr. B. Pilot Bedford, the River Surveyor, whose log and register at Mud Point we shall presently quote.

To come back to Kedgerree then :

		And gale recom- menced at
The <i>Precursor</i> log says, it fell calm at,.....	4h. 30'	5h. 0'
The log of the Pilot on board the <i>Precursor</i> says, it fell calm at, . . . . .	5h. 00'	5h. 30'
<i>Grappler's</i> log says, moderating at 6h., and <i>veering</i> about the same time or say 6h. 10,.....	6h. 00'	6h. 10'
	<hr/> 15h. 30'	<hr/> 16h. 40

The mean of these for the station of Kedgerree  
will be, ..... 5h. 10' 5h. 33  
Or that the centre passed there about 5.20 A. M. of the 23rd Oct.

We then find the next certain position near to the centre to be that of the H. C. S. *Megna* off Mud Point at 7 A. M. when "it moderated for a short time and shifted to North" having previously blown at E. S. E. ; but it seems by Mr. Bedford's table to have veered shortly after to N. N. E. and thus to have been for three or four hours before the shift at E. S. E., and for two hours after it at N. N. E. which we must take therefore, to indicate pretty nearly the track of the main body of the Cyclone. This would give us a track to the N. East for that of the Cyclone from Kedgerree. And as we shall subsequently shew the calm space itself was hereabouts of very small extent, so that we may take this to be not far from the truth.

From this station, the track to the N. East carries us into the wilds of the Sunderbunds, whence no reports can be obtained, and we cannot consider the Noacolly and Chittagong Cyclone to be any part of this at Kedgerree, as its track, was evidently from South to North, and it commenced within 12 hours of the passage of the centre at Mud Point. The veering of the wind with H. M. S. *For* at Diamond Harbour, I need not remark, is exactly that of a Cyclone passing up on a N. E. track to the South-East and East of the Vessel, her Barometer being lowest (29.375) with the wind North, shewing that the centre was nearest to her when bearing East.

RATE OF TRAVELLING.—We have, from the foregoing documents, a tolerably exact knowledge of the time which the Cyclone centre took to travel from a position a few miles West (inland) from the Light House on False Point; on perhaps a somewhat curving track up to Kedgerree, which was from 8 A. M. on the 22nd to 5h. 20' A. M. on the 23rd, or 21h. 20' of time. Now the distance on a straight line between these points is 115 miles\* which gives a rate of 5.4 (five miles, four-tenths) per hour for that of the Cyclone's travelling on this part of its course; and we find moreover that passing Kedgerree at 5h. 20' A. M. it moderated for a short interval at 7 A. M. with Mr. Bedford at Mud Point, and at 8, there was a sudden shift when it blew as hard as ever; so that taking the centre to have passed thus at 7h. 30' A. M. this gives about an interval of two hours for it to traverse from Kedgerree Light House to Mud Point, a distance of 11 miles or 5.5 miles per hour, the former rate being 5.4.

We have thus very fairly the rate of travelling for the 22nd,—23rd, and if we were to assume that on the 21st, 22nd, it was travelling at the same rate, we should only have to measure back 132 miles to find the place of the centre of the *Ararat's* Cyclone for the 21st; but this distance so measured would only place the centre far enough to the South, to give the *Ararat* a S. W. wind, whereas we see by her log she had it still at about South or at most S. b. W. so that our former estimation of the place of the centre as being at about 175 miles South of False Point is probably the correct one. This distance would give

\* 113 miles from Light House to Light House, but 2 miles more are allowed for the centre being to the Westward of Kedgerree.

it a rate of travelling of 7.3 per hour on the 21st and 22nd, so that its progress was, as usual, somewhat retarded by the land.

THE DIAMETER OF THE CALM CENTRE.—This is always an element of much interest where we can obtain any approximation to it. And in this Cyclone we have a very good one, for we have seen above that the rate of travelling between False Point and Kedgerree Light Houses was 5.4 per hour, and we learn from Mr. Barckley's capital report that it fell "stark calm" at 7h. 30', and that it was blowing a complete hurricane at 9h. 30' A. M. of the 22nd; and as the actual centre passed somewhat to the Westward of the Light House p. 543 we may take 2 hours at 5.4, or ten miles eight-tenths, or say in round numbers eleven miles as the diameter of the centre there on that day; but on the 23rd at Kedgerree, it seems to have much diminished as the calm interval there was not more than half an hour, which would give but  $2\frac{1}{2}$  miles for the diameter of the centre; and with the *Megna* off Mud Point, at the N. West extremity of Saugor Island, though the centre must have passed very close to the S. East of her (shift from E. S. E. to N. N. E.) it moderated only for a very short interval. With the *Hope*, Light Vessel off the S. W. part of Saugor Island, no calm occurred. The American ship *Sturgis* in Saugor Roads while the centre was passing her, had the wind veering from E. N. E. to South and a slight lull "for a few moments," is afterwards noticed at 6 A. M. but this was no part of the centre, and it is evident that on this day, there was no extensive calm space at the centre.

#### THE PORTSMOUTH'S LOG AND PROTEST.

I obtained through the attention of Chas. Huffnagle, Esq. American Consul at Calcutta, a copy of the Protest and an extract from the Log of the American Ship *Portsmouth* of New York; but there are unfortunately so many discrepancies between them, and again between these and the newspaper report, that as regards the ship's exact position, and even the dates, I am wholly unable to reconcile them without the most arbitrary and unwarrantable changes, and unfortunately again, I could not obtain a sight or copy of the ship's detailed log, nor a comparison for her Barometer, so that for tracking the Cyclone, they are quite useless.

But there are some details of great interest in these papers which appear to me to indicate that this ship may possibly have been caught at the junction of the two Cyclones! or at least to have experienced one or more tornados (and this is the word too used in the log and protest) at or near to the centre of the Cyclone into which she ran. In the following brief summary which is compiled from both the log and the protest, the expressions between commas are those of the documents themselves.

The *Portsmouth* appears to have run up with strong gales from the S. W. and S. S. W. which veered to S. East when she hove to, and soon had it "blowing a perfect hurricane" which blew away her close-reefed main topsail, and sails from the gaskets, and reduced her to bare poles, wind still at S. East, ballast shifting from the ship lying on her beam ends.

"At 3 P. M. it fell nearly calm with a light breeze from south; Barometer suddenly fell from 29.40 to 28.30! Deck covered with snipes, butterflies, locusts and grasshoppers, water discoloured, ship drifting towards the land; 5 P. M. tornado struck the ship from the southward; bent the cables; 7, ship on her beam ends with her ballast shifted, and expected she would go over, cut away main and mizen masts and lost foretopmast. At 10, moderate wind at S. S. W. but Barometer still at 28.30; midnight a third tornado struck the ship from S. S. W. more severe than before. The wind now *burst up*\* both main and after hatches, and the dead-lights from the cabin, windows," says the Protest. The log extract says, "Hatches bursting off in spite of bars and spikes, Round-house blown all to pieces and dead-lights from the stern windows." Protest again says, "The carved work was blown from the stern, the Round-house on deck blown to pieces, and no man could stand on deck without holding on." 2 A. M. Barometer rising; 6 A. M. gale abated.

From this detail, there appears clearly to have been separate centres, or local tornados, formed at the edges or by the interference of the two Cyclones? for the first calm and extraordinary fall of the Barometers occurs at 3 P. M.; then at an interval of two hours, or 5 P. M. a tornado (used hereto express the violent burst of a furious gale)

\* So in the originals, but I had no opportunity, I regret to say, of making inquiries as the ship had left Calcutta, when the documents reached me.

"strikes" the ship; then it moderates at 10 p. m. but the Barometer is still depressed, and at midnight a third tornado "strikes" the ship!

Now, if these singular (we may almost say wonderful) phenomena occurred all within a brief period, say of an hour or even two, we might account for them by supposing the centre for a time stationary, and that the ship was drifted back into the calm vortex a second time, or carried on into it in some way, or that it had in some way vibrated or revolved, as Mr. Redfield supposes the centre may do to a certain extent, so as to reach the helpless ship again. But an interval of *nine hours*, that is, from 3 p. m. to midnight seems to put this out of the question; for the Cyclone, if single, must have curved forward some distance; though it may possibly have been carrying the ship with it, as in the case of the *Briton* and *Runnimede* which were whirled round and round and carried forwards for hours before they were thrown on shore (see Journ. Vol. XIV. p. 357 Twelfth Memoir) but then in that case the wind would have veered or shifted somewhat, which it did not do with the *Portsmouth*. The *Briton* had, like the *Portsmouth*, two lulls and three onsets of the hurricane, but then the wind was veering all round the compass, and the *Runnimede* close to her had but one lull; and the fact of the *Portsmouth's* Barometer having remained stationary seems conclusive, not only as to there having been double Cyclones following each other, but moreover that, as we have nearly demonstrated in the case of the *Eliza* (9th Memoir as before quoted p. 542) this continued depression of the Barometer is what really occurs in such cases, and on this account alone the record of the fact, whenever and wheresoever it happened, is most important.

The "bursting up" of the hatches is so loosely described, that we are at some loss how to consider it. It might be a bursting up of the hatches by the force of the wind getting below, which though difficult to conceive in a ship in such weather, would be analogous to what takes place in the great West India Hurricanes, where, when a door or window is burst open the other windows are *blown out*, and even the roofs blown off if another window on the opposite side is not opened to allow the exit of the air forced in by the hurricane. Or it might be the hatches getting loose by the working of the deck combing, and so falling in; though this would not be "bursting up" or it

might be *partly* the force of the wind below, (though as I have before remarked, this is very incredible and improbable,) and *partly* some uplifting power in the peculiar electric state of the atmosphere at the time, analogous to the attractions and repulsions of light bodies between oppositely electrified conductors.\*

*The set to the Westward over the Sand Heads.*—This most dangerous set, it will be seen, was fully experienced in this Cyclone, and it is so fraught with danger to the mariner that his attention cannot be too closely directed to it. It becomes in fact at the approach of a Cyclone, a complete Gulf Stream! a term which every Atlantic sailor perfectly understands. It is also, and this often as early as the Barometer, and before the appearances of the sky and clouds are at all remarkable, an almost infallible sign of the approach or distant passage of a Cyclone!

### CONCLUSION.

I have had somewhere to say that almost every successive memoir brings some new fact of importance to light, to reward us as it were for our labour, in carefully collecting and following out the details. And this, the TWENTY-THIRD of the series is no exception to the rule; for it discloses to us, not only a new track of which, though suspected, we had as yet no instance, but it also offers us another proof that here as in the China sea, the law of curving, or recurving, about the latitude of the tropics at times holds good. Upon what this depends, we are at present totally ignorant, and it is probably some effect of those great laws of atmospheric agency by which Cyclones are generated. For the present our task is to collect and register, and to sum up our preliminary results, which never fail, as we see, of affording us some practical advantage, and thus we may hope that we are doubly advancing the cause of science by eliminating that which is of present utility and by aiding in the research for general laws when sufficient facts shall be collected to deduce them.

\* See Horn Book of Storms, 2nd edition, pp. 268 and 270 for instances of this electrical effect in water-spouts, as also the log of the Brig *Freak*, Journ. As. So. Vol. IX. page 1014. Third Memoir; where the vessel's foremast is torn out of her, carried up aloft, and falls down again on the deck!



*Some Remarks on the Origin of the Afghán people and dialect and on the connexion of the Pushto language with the Zend and Pehlavi and the Hebrew.—By LIEUT. H. G. RAVEETY, 3rd Regt. Bombay N. I. Asst. Commissioner, Múltán.*

In all investigations into the manners and customs of mankind, which must ever be an interesting enquiry, language has a strong claim to our attention and study. It will be found, in various ways, such an unerring guide, that we may term it the barometer of a people's civilization or barbarity; whilst on the other hand the derivation and affinity of different tongues, afford an indisputable proof of the origin and genealogy of the various families of the human race. It also adds a physical certainty to historical evidence, and at the same time, no authority can so indubitably determine the peculiar habits and pursuits of a people, as the manner in which their thoughts and ideas are articulated and expressed; for want of copiousness, or poverty of a language, as it may be termed, generally indicates an uncivilized state—ignorance, and superstition.

By oral means alone can a dialect be formed or extended, but its subsequent cultivation must depend on writing and literature; and knowledge, on which civilization, and refinement—in fact, on which every thing that tends to raise mankind above the level of the brute depends, must naturally be confined within exceedingly narrow limits, until a written language has diffused it throughout all classes of mankind.

Before venturing to offer an opinion as to the origin of the Pushto language, it will be necessary to make a few observations respecting the topography, as it may be termed, of the ancient languages of Asia, more particularly those from which we may naturally suppose the Pushto or Afghánian language to have sprung; still all researches into high antiquity are more or less involved in darkness and perplexity, and every argumentative enquiry, however ingenious, must at last rest on the uncertain basis of conjecture and fancy.

According to the accounts of Herodotus and other ancient writers, we find, as is the case even at the present day, that in cer-

tain countries of no great extent, a variety of languages, totally distinct from each other, was used; whilst on the other hand again, the same language, with slight variations in its dialects, was spoken throughout regions of very great extent. The first remarks are applicable to nearly all mountainous districts, inhabited like Afghanistan by various tribes, for the most part independent of each other.

Throughout the boundless steppes of the Asiatic continent were spread the more prevalent languages. The limits of the various dialects also, were the same stupendous ranges of mountains, and the same noble and mighty rivers, which formed the boundaries of the different territories. Between the Attak or Indus, the Æman or Oxus, and the banks of the Dajlah or Tigris, one language appears to have predominated, a second between the Tigris to the Halys or Kizil Irmak, and a third betwixt the latter river to the Ægean sea.

To commence with the language which appears to have been most widely prevalent in ancient times, we find that from the Caucasian\* range of mountains on the north, to the Red sea on the south, and from the banks of the Euphrates on the east to the Halys on the west, one mighty tongue was spoken, which, with some slight variations, retained a primitive and distinct character, known as the Semitic, and of which the Arabic, Assyrian, Chaldaic, Cappadocian, Hebrew, Sarmatian, and Phœnician were merely dialects.†

From the Tigris eastward, as far possibly as the mountain range which forms the western barrier of the Indus, and from the Oxus to the Indian sea, another great language prevailed—the various dialects of which, both in elements and construction; as also in vocabulary and phraseology, were so totally distinct, as to preclude the possibility of their being of the same family as the Semitic. One peculiar feature of the ancient dialects of Persia is, that every vowel, whether short or long, has a distinct character. We are indebted to the labours of several eminent scholars in Zend literature for many important facts on this subject, particularly in the Zend Avesta

\* That is to say, what is at present known as the Caucasian range, not the Koh-i-Káf of the ancient Arabian authors.

† Heeren.

the sacred volume of the *Pársí* or *Guebres*, two English translations of which are about to be given to the world—one by a European Orientalist, the other by an Asiatic, and a disciple of *Sapetman Zoroaster*. From these researches we find, that three different languages were spoken in *Irán\**—the *Zend*, in which the sacred books of their religion were written; the *Pehlavi*; and the ancient Persian, or *Pársí*. The date from which the *Zend* ceased to be the medium of conversation is unknown, but as early as the reign of *Bahmán*, the *Pehlavi* was considered rude, and on this account held in distaste at the court of that ruler;† and in the reign of *Bahrám Gúr,‡* in the 5th century of our era, was proscribed by edict, and soon after fell into total disuse. After this event the *Fársí* became the idiom of Persia. It was divided into two dialects—the *Derí*, or court language, and the *Pársí*, which was spoken by the people at large. The *Shah Náme*h of *Ferdousí* is almost entirely written in the former tongue.

If we compare these dialects with the modern Persian, divested of the Arabic and Turkish, which, during a period of several centuries, has crept into it, we shall find them differing essentially in several respects; but at the same time, in phraseology and construction, bearing such a striking similarity, as to prove almost indubitably, that the dialects themselves, as also the people who spoke them, must have sprung from one and the same original stock.

It is a striking fact that no convulsions of government, no efforts of literature, can so alter a language as to destroy every atom of similarity between the speech of the present day, and that of most ancient and remote origin. Nothing but the total extirpation of the aborigines of a country appears capable of accomplishing so singular and wonderful a change. For a striking instance of this

\* The eastern name for Persia.

† According to the *Ferang Jehángírí*, *Bahmán* also called *Ardíshír*, was son of *Isfandiar*, son of *Kashtásib*, son of *Lobrásib*. Some say he was so called for his uprightness and justice; others, that it was from his precociousness as a child; and others, that it was on account of the length of his arms which were so long that his hands reached his knees. There are no less than thirteen meanings given to this word in the work I have quoted: he died A. D. 240.

‡ He ascended the throne A. D. 420, and reigned twenty years.

we have merely to look to the present dialects of the peninsula of India, or, for a still more conclusive proof, to the modern European languages, amidst the polish and refinement of Latin and Greek.

It appears, therefore, that the principal languages of the Asiatic continent, that is to say, what was considered Asia by the ancients, were the Semitic, and the Iránian or Persian,\* which latter was spoken as far as the western bank of the Indus, beyond which the Sanskrit and Prakrit commenced.†

In ancient times as in the present day, the greatest diversity of language appears to have prevailed in mountain tracts, generally inhabited by a number of independent tribes, who may either have been aborigines of those mountains, or strangers compelled to seek in them refuge from more powerful neighbours, or greater security from invasion and subjection to a sovereign's yoke. In the absence of facilities for communication with foreigners, their languages have been less liable to be mixed up with other tongues, and from the more numerous tribes again separating into smaller tribes, a variety of dialects was naturally formed, which in many points differed from each other.

The ancient languages of Persia, suggest other important facts not to be passed over without notice, and which also bring us to the point to which these straggling and imperfect remarks are intended to lead—that not merely in the modern Persian territory do we find languages which still exist, mixed up with others, and only preserved from oblivion by a few written remains; but that in the present day there is also a language spoken immediately west of the Indus, which is totally different in phraseology and construction from any

\* Heeren.

† “ With regard to the affinity of the language from Bactria to the Persian Gulf, it would of course follow, that the country being that of the ancient Persians, the Persian language would be spoken in it, varied as to dialect, but radically the same. If the language of Persia was Zend, this would have been in use throughout Ariana; and its strong affinity to Sanskrit would justify the extension of Strabo's remarks even to the Indians of the Paropamisus and the west bank of the Indus. With all the other divisions of Ariana there is no difficulty, even if the Persian of ancient did not materially differ from that of modern times; for Persian is still the language of the inhabitants of the towns of Afghanistan and Turkistan—Kabul and Bokhara.” *Ariana Antiqua*, pp. 122, 123.

modern tongue, and in all probability derived from the Zend, Pehlavi and the Hebrew. The language to which I refer is the Pukhto, Pushto, or Afghánián.

Languages can alone be fashioned and extended by oral use, though by writing and literature, their subsequent cultivation can be effected, and it is therefore certain that the dead languages of the Asiatic continent must at one time have been generally spoken,\* from the fact, that several living languages are evidently derived from them.† The cause of their ceasing to be the medium of communication may have arisen in various ways—the intercourse with foreigners brought thither by commercial pursuits, subjugation to the yoke of others, and such like circumstances, so affect a language as to produce various new dialects, which, as proved by our own mother-tongue, are capable of undergoing still further transformation.

There has perhaps never been a greater diversity of opinion, respecting the descent of any one people, than that of the Afgháns. Ferishtah‡ traces their origin to the Copts, whilst most oriental writers are of opinion that they are of Jewish family. According to Klaproth, Gatterer considers the Afgháns to be a Georgian race, and their language Georgian also. The Armenians hold the Afgháns to be descended from themselves; and Krusinsky, Reineggs, and several other European historians, notwithstanding the want of proof to support such an opinion, appear convinced of it. Major Keppel§ (now Earl of Albemarle) states that the people of Shirwán, and the adjoining countries, consider the Afgháns are descended from them. St. Martin|| in his account of the Armenian Arghowans, is of opinion, that the Afgháns cannot be identified with them. Other authors have declared them to be descendants of the Indú-Scythians, the Medians, the Soghdians, Turks, Tartars, and Moughols.¶

\* I have lately heard of a seal having been found near Pind Dadun Khan, in the Panjáb, bearing an inscription in the arrow-headed character.

† Heeren.

‡ *Tárikh-i-Ferishtah*.

§ *Personal Narrative of travels*, vol. II. page 194.

|| *Memoires sur Armenie*, Vol. I. page 213 to 226.

¶ See *Tárikh-ul-Yamini* of Atbi, *Matlaa-us-Salácin*, and *Jami-ul-Tawárikh*.

The Afgháns themselves persist in their descent from the Jews, and their traditions on the subject trace their ancestry to Saul, king of Israel.\*

The best account I have met with on the subject, has lately fallen into my hands quite unexpectedly. It is contained in a history of the house of Saddo or Saddozoé tribe of the Afgháns. The work itself is written in Svo. 640 pages of 17 lines to a page, and entitled, *Tazkirát-ul-mulúk*. It is very rare, and I imagine there is not a copy to be found east of the Indus, even if it has ever been heard of before by Europeans. Two-thirds of the entire work are occupied in the detail of events which have happened since the death of Ahmed Sháh, Abdáli. The commencement alone is sufficient for my present purpose; on some future occasion I may give a translation of that part which terminates with the death of the founder of the Dúrání monarchy. I may also add, that the work is written in Pushto. The account is as follows.

“The chief object of the author in writing this august work, was the compilation of a history of the ancestors of the tribe of Saddo, known as the Saddozoés, who, after the family of the last of the Prophets, (on whom be the blessing of the Almighty) are the greatest and best, as well as the most generous and open-hearted of the children of Adam.

“All traditions and histories agree, as to their exalted descent from the Ban-i-Israel, of whom their great ancestor is Malik Tálút (Saul) of the tribe of Israel, who afterwards became the ruler of that people. From Malik Tálút is descended Afghán, one of the greatest of God’s creatures, and who in the reign of Súlimán, was, by that monarch, made sovereign of the Jíns and Diws.

“From Malik Afghán, Abd-ur-Rashid bin Kais-al-laik, who was a contemporary of the prophet of God, and one of his most honoured associates, is a lineal descendant. He is the ancestor of the Sarbands, who are considered the first of the Afghán tribes, as also of the twelve *astanas* or families who were formerly considered as hereditary devotees.†

\* See Sir G. Rose’s *Afgháns, the Ten Tribes and the Kings of the East*, &c. lately published.

† Both Mr. Elphinstone, (*Kabul* Vol. 1st page 253) and Professor Dorn,

"His Highness Saddo chief of the Afgháns, being the fruit of the tree of that garden, and a blossom of that rose tree, this account of his ancestry has been compiled to the end, that their fame may be known to posterity.

"What can we inherit, but fame beyond the limits of the tomb."

"The following histories and authorities have been consulted in the composition of the work, viz. ;—*Tárikh-i-Salatín-i-Súreah* ; *Tabakát-i-Akbirí* ; *Aæn-i-Akbirí* ; *Mirát-ul-Afghánah*, which work was written by Khán Jehán, Ludhi, in the reign of the Emperor Jehángir ; *Tárikh-i-Sháhán-i-Safawiah*, *Irání* ; *Sháh Jehán Náme*h ; *Tárikh Alamgiri* ; *Furukh Seorí* ; *Tárikh-i-Mahommed Sháhí* ; *Nádír Náme*h ; *Tárikh Ahmed Sháhí* ; *Rassalah Akbar*, *Khadkah* ; and other information has been collected from the narratives of trustworthy persons. I have entitled the work, *Tazkirát-ul-Mulúk*, of the ancestry of the tribe of Saddo, the chief of the Afgháns. It consists of one *mukaddamah* (preface), two *asals* (originals), and one *khútímah* (epilogue).\*"

#### *Mukaddamah.*

On the forefather of Saddo, Chief of the Afghán people.

The great ancestor of this tribe is Malik Tálút (Saul) who is mentioned in the Korán and other works, as descended from Binyamín,

(Neamat Ullah, Part II. page 40) have fallen into error respecting this *fourth* grand division of the Afgháns, called by them respectively the Betnee, and Botni, Baiṭni, or Báṭiní. باطنی is not the name of a tribe, but is derived from the Arabic باطن batin which means, *hidden, or knowing the hidden or concealed, hence the Al-mighty is often termed.* الباطن *Al Batin*.

\* The contents of the whole work are ;—*Mukaddamah*. On the forefathers of Saddo, chief of the Afgháns. First *Asal*. On the subject of those of the tribe who have ever dwelt in Afghánistan. This *Asal* is divided into two *Faræ* or Parts. 1st. Respecting that branch who have ruled over the whole tribe. 2nd. On the other members of the tribe, who still dwell in their native country. Second *Asal*. On that branch of the clan who left their country and took up their abode at Múltán. This is in five *Faræ* or parts. 1st. On the Khan Modud Khail. 2nd. The history of the Bahádúr Khail. 3rd. Account of the Kámrán Khail. 4th. Account of the Zæfarán Khail. 5th. The Khwájah Khizar Khail, who are generally known as the Súltán Khail, Khodkah. *Khátímah*. Account of the remaining branches of the Khwájah Khizar Khail, the descendants of Shah Dur-i-Durán, and their dispersion into various parts of India, and the Panjáb.

bin Yákúb, bin Issák, bin Ibráhím (may the blessing of the Almighty rest on them and on their house). Tálút was celebrated amongst his countrymen for his wisdom, knowledge, and mightiness in war; and the All-wise Creator of the Universe, made him king over Israel, and commanded him to bring to perdition the infidel Jálút, the enemy of his people.\*

At this time Mehtar Dáoud, who dwelt in the district situated between the territories of the rival princes, went and joined the army of his countrymen,† who were hard pressed by the superior army of Jálút.‡ The king on this account issued a proclamation to the effect, that whoever would go forth to fight with Jálút

\* And their prophet answered and said unto them, verily God hath set Tálút king over you, and hath enlightened his mind, and strengthened his arm: they answered, How shall he reign over us, seeing that we are more worthy of the kingdom than he, neither is he possessed of great riches? Samuel said, Verily God hath chosen him before you, and hath caused him to increase in knowledge and stature." *Al Korán. Chap. II.*

"Now there was a man of Benjamin, whose name was Kish, the son of Abiel the son of Zeror, the son of Beehorath the son of Aphiah, a Benjamite, a mighty man of power.

And he had a son, whose name was Saul, a choice young man, and a goodly: and *there was* not amongst the children of Israel a goodlier person than he: from the shoulders and upwards *he was* higher than any of the people. 1st Samuel, Chap. ix. verses 1, 2.

So Saul took the kingdom over Israel, and fought against all his enemies on every side, against Moab, and against the children of Ammon, and against Edom and against the kings of Zobah, and against the Philistines: and whithersoever he turned himself, he vexed them.

And he gathered an host and smote the Amalekites, and delivered Israel out of the hands of them that spoiled them. 1st Samuel, Chap. xiv. verses 47, 48.

† Wherefore Saul sent messengers unto Jesse, and said, Send me David thy son, which *is* with the sheep.

And Jesse took an ass laden with bread, and a bottle of wine, and a kid, and sent them by David his son unto Saul. 1st Samuel, Chap. xvi. verses 19 and 20.

‡ Now Saul, and they and all the men of Israel, were in the valley of Elah fighting with the Philistines.

And David rose up early in the morning, and left the sheep with a keeper, and took, and went, as Jesse had commanded him; and he came to the trench, as the host was going forth to the fight, and shouted for the battle." 1st Samuel, Chap. xvii. verses 19, 20.



(Goliath) and kill him, should receive the hand of the king's daughter in marriage, and be declared heir to the throne.

When Tálút went out to meet Jálút his troops, being seized with a sudden panic, fled from the field with the exception of 313 persons, who, by the will of God, took courage and remained with their king.\* It was at this time that Dáoud killed the infidel Jálút in single fight, after which the small but brave band which had stood its ground, fought with such determined courage that the enemy were entirely defeated and put to the rout.†

After this action on the part of Mehtar Dáoud, it became incumbent on king Tálút to fulfil the terms of the covenant which he had made, and accordingly he gave his daughter to Dáoud in marriage, and a patent of succession to the throne.

During the life-time of king Tálút, Dáoud served him faithfully, and at his death succeeded him. Armíah (Jeremiah) and Birkíya, Tálút's sons, were raised to the highest honours, became the captains of his armies, and continued in his service during their life-time.

In the common course of events, Dáoud himself set out on that journey from which no traveller returneth, and was succeeded by his son Súlímán. He appointed Afghána the son of Armíah, to the

\* "And Tálút said unto his soldiers, verily God will prove you by the river, for he that drinketh thereof shall not be on my side (but he shall be on my side who shall not taste thereof) except he who drinketh a draught of the water out of his hand. And they drank thereof, except a few of them. And when they had passed over the river, he and those who believed with him, said, We have no strength this day against Jálút and his host. But they who considered that they should meet God at the resurrection, said, How often hath a small army by the will of God, defeated a greater one, and discomfited it, for God is with those who patiently persevere. And when they went forth to battle against Jálút and his forces, they said, Oh Lord, pour on us patience, confirm our feet, and help us against this unbelieving people. Therefore they discomfited them by the Almighty will, and Dáoud slew Jálút." *Al Korán. Chap. II.*

† "And the men of Israel and of Judah arose, and shouted, and pursued the Philistines, until they came to the valley, and to the gates of Ekron. And the wounded of the Philistines fell down by the way to Shaaraim, even unto Gath, and unto Ekron.

And the children of Israel returned from chasing after the Philistines, and they spoiled their tents." *1st Samuel, Chap. xvii. verses 52, 53.*

command of his armies, and the government of the Jins and Diws;\* whilst Asif, the son of Tálút's son Birkíya, was made his principal minister.

One day king Súlímán seated on his throne and accompanied by his minister was journeying through the air,† when they passed the district of Rúdah, in which is situated the lofty mountain of Káseghar, which lies between Pesháwer and Kandáhár, and Kábul and Múltán. It is near the town of Darában and west of the Sindhu (Indus) river.

Pleased with the spot, and the salubrity of the climate, the wisest of men directed his minister to form a seat out of a stone which was at hand. This being almost immediately done, Súlímán sat in it for some time and enjoyed the beauty of the landscape which lay spread out at his feet. The mountain is known at present as the Takht or (Throne) of Súlímán.‡ A portion of the throne still remains, to which the people of the surrounding districts, are in the habit of making pilgrimages.

\* "This statement will not appear so fabulous if we compare it, with Samuel 2d. Chap. xxi. verses 15 to 22, for Diw, and Jin, mean—a giant as well as a demon or genii—دیو díw. A devil, a demon, genius, giant, spirit, ghost, hobgoblin. The Díws or Dives, Jíns, Genii, or giants of eastern mythology, are a race of malignant beings. See جن also in Richardson.

† "No name is more famous among Muhammedans than that of Solomon. According to their belief, he succeeded David his father when only 12 years old; at which age the Almighty placed under his command, all mankind, the beasts of the earth and the fowls of the air, the elements, and the genii. His throne was magnificent beyond description. The birds were his constant attendants, screening him like a canopy from the inclemencies of the weather, whilst the winds bore him whithersoever he wished to go. Every age and every nation have had their fooleries, and even many of the received opinions of modern times will not bear the touchstone of Truth. The sorcery laws of our country are a far more authentic disgrace to human nature, than all the wild, yet pleasing fables of the East." See Richardson.

‡ "In the southern part of the Wuzeeree country, where this range is passed through by the river Gomul, it is low in both senses, and forms the lofty mountain of *Cussay Ghur*, of which the Tukht of Súlímán, or Solomon's Throne is the highest peak." Account of the kingdom of Cabul. vol. 1st page 164.

"I was told that on the top there was a holy stone or rock, the seat of a Musulman Fakir, whose name it bears; but I venture to doubt the story." Vigne's Ghuzni, Cabul, &c. Page 61.

The mountain tract of Káseghar, and the district of Rúdah, were assigned in feudal tenure to Afghána.

The original meaning of the word Afghana is *fighán*—a Persian word, which means “*complaint*,” “*lamentation*,” because he was a cause of lamentation to the devil, jins, and mankind. From the constant use of the word, the vowel point (ـ) *kasrah* was dropped, after which the other letters could not be sounded without the aid of a vowel, and *alif-i-wasl* was placed before the *gh*, and thus made Afghána.

Malik Afghán having taken possession of his new territory, (to use the expressive words of the author) “irrigated the land of that mountainous country with the water of the sword, and planted in the hearts of its inhabitants, the seeds of his own faith. He fixed his residence at a place named *Púsh* or *Púsh*, situated in the mountains, and from the name of this place, the people have derived the name of Pushtún, and their language Pushto. Some traditions state that the Afgháns acquired their language from the Diws, and others, that it is the original dialect of the aboriginal inhabitants of Káseghar, and that the Afgháns were in the habit of carrying off the wives and daughters of those Infidels, and intermarrying with them,\* thereby learning from them the Pushto language, and in course of time forgetting their own Ibrahámí tongue.†”

Again to use the words of the author, “Malik Afghán having purified the face of the mistress of that country from the filth of the wicked infidels by the pure water of the sword, and having given unto her the rouge of beneficence, and decked her out in the bridal garments of religion and the ornaments of Islam, bestowed her in the marriage of possession to one of his sons,” after which he returned to the court of king Súlímán, at Bait-ul-Mukaddas,‡ where at length he died at a very advanced age. His descendants from generation to generation, and from tribe to tribe, continued to dwell round about the mountain of Káseghar and to rule over it, and were at constant war with the Infidels, as the neighbouring people were termed.

\* See the Kullasat-ul-Ansáb.

† Ibrahámí means the Hebrew language.

‡ بَيْتُ الْمَقْدَسِ The Sanctified or Holy Temple—the Arabic name for Jerusalem.

At length, during the chieftainship of Abd-ur-Rashíd bin Kais al Laik, an event happened which was the cause of shaking the world to its very foundations\*—the joyful tidings of the last and greatest of the Prophets, resounded both in Arab and in Aján, and Abd-ur-Rashíd became desirous of making a pilgrimage to Mekka for the purpose of seeing him :—

“ Love ariseth not alone from seeing the object ;”

“ This wealth is often acquired by mere conversation.”

In company with several of his kinsmen and friends, he set out for the Hedjáz, and having arrived at Mekka, performed his pilgrimage according to the rites and tenets of the religion of his forefathers, Israel, Issák, and Ibráhím.† He now set out for Medina, and on the road fell in with the celebrated Khalid-ibn-Wálid, “ the sword of God,”—to whom he explained the object of his journey. They travelled towards Medina in company, and on his arrival there, Abd-ur-Rashíd became a convert to Islám. In the numerous struggles of that period, he became conspicuous for his intrepid bravery, which made the Prophet bestow on him the surname of *باتان* or *پتان* ‡ (batán or patán) which in Arabic means the *mast* of a vessel, without which it cannot sail, neither can the ship of war sail along without the mast of battle.

Abd-ur-Rashíd having acquired great renown, at length obtained his dismissal, and was allowed by the Prophet to return to his native land, but was at the same time enjoined to publish and diffuse the doctrines of Islámism amongst his countrymen. He departed from Medina, and in due course reached his home in safety, after which

\* Allowance will of course be made for religious prejudice.

† “ The temple of Mecca was a place of worship, and in singular veneration with the Arabs from great antiquity, and many centuries before Muhammad. Though it was most probably dedicated at first to an idolatrous use, yet the Muhammadans are generally persuaded that the Caaba is almost coeval with the world ; for they say that Adam, after his expulsion from paradise, begged of God that he might erect a building like that he had seen there, called Beit-al-Mamúr, or the frequented house, and al-Doráh, towards which he might direct his prayers and which he might compass, as the angels do the celestial one.” Sale’s Introduction to the Korán Page 83.

‡ This word I cannot find in either Kámus, Burhan Kátacé, or Richardson.

he converted his family and tribe to the new faith, and taught them the Korán. He made war on the infidels with greater zeal than ever, and was celebrated for his piety. At length finding his end approaching, he called his family and tribe around him, and enjoined them to keep their hearts fixed on the only true religion, and their feet firm in the path of Islám; to show friendship and obedience to the followers of Muhammad, and to make war on the infidels, and convert them to the only true faith. After taking an affectionate leave of all, "the swallow of his soul having escaped from the wintry cage of this world, took its flight towards the summer mansions of eternal bliss."

He was blessed with three sons.—Sarí, Gharí, and Tabrí. The first known as Sarban or Sarband, succeeded his father in the chieftainship, and gave name to one of the two great divisions of the Afgháns called Sarbans. The second also called Gharghasht, gave name to the Gharghashts. The descendants of these three sons constitute the whole of the different Afghán clans, with their numerous branches and ramifications.

The tribes which are included in the Sarban division, are;—Abdálí, Tarín, Barech, Mabánah, Gharshín, Shirání, Bábarí, Kánsí, Jamand, Kátaní, Kalíáuí, Tarkání, Khalíl, Mhomand, Dáoudzoé,\* and Yúsufzo'e. The twelve *Astánahs* or families who are considered sacred by the other Afgháns, from their progenitors having been devotees, are also included amongst the Sarbans. The Abdálí, Tarín, Bábarí, Jamand and Yúsufzo'e tribes have each one family, the Khalíl three, and the Mhomands four.

The different branches of the Gharghasht division or offspring of Gharí, are;—the Surání, Jailam, Drukzo'e Afrídí, Chakání, Junkí or Jungí, Kerání, Bábí, and Mashwání tribes.

The third son, Tabrí, is the progenitor of the Ghalzo'e, Lúdhí, Níazí, Lobání, Sorbaní, and Klakpúr clans, the whole of whom are styled Tabríns. It is said there was an illicit connexion between one of the daughters of Tabrí, and Mast Ali Ghorí,† and after a short time

\* Zo'e in Púshto means, son—zái is a corruption of the word.

† The ancestor of the Ghorían Sultans who conquered Ghazní, in 1152. *غل* *ghal* in Púshto means a thief, and *زوي* *zoé* a son, hence *غلزوي* *Ghalzoé* the son of a thief; *زاي* is a mere corruption of the word.

the fruits of this amour becoming apparent, the father, to make the best of a bad matter, gave her to him in marriage. Three sons were the offspring of this marriage—Ghalzo'e of whom she was pregnant before the nuptial knot was tied,—Lúdhí, and Sarwání.

The tribes above mentioned are the whole of those who are of pure Afghán descent—the offshoots of the three sons of Abd-ur-Rashíd, Pátan. He was buried at Kásegbar, and succeeded by his eldest son Sári, who was constantly at war with the Kafirs or Infidels. He had two sons—Sharkabun, and Kharshabun. The Sarbans are the descendants of the former, and the Yúsufzo'es, Mohmands, Khalíls and other tribes inhabiting the plain of Pesháwer, are the children of the latter.

On the death of Sári, Sharkabun his son was acknowledged chief of the Afghánah. He was celebrated for his piety and wisdom. In his wars with the infidels, he not only acquired great wealth, but also increased his territory, and brought many of the neighbouring tribes under his authority. During his chieftainship Kandáhár, and Kábul were conquered by Hújáj bin Yúsuf, Sakafí, who was governor of Khorásán for the Khalífah Abd-ul-Malik bin Mirwán who reigned from 692 to 698 A. D. This event greatly increased the authority of Sharkabun, and established his power more firmly than before.

He is said to have been succeeded by Abdál his son. Some accounts mention that he was the son of Sharkabun, and others that he was his grandson, but neither of these accounts can be correct, as there is a space of nearly three hundred years between them; Sharkabun being a cotemporary of Hújáj bin Yúsuf Sakafí, before referred to, whilst Malik Abdál lived in the reign of Máhmúd bin Sabuktagin, who succeeded his father to the throne of Ghazní, in the year of the Hijrah 337. This great hiatus between the reigns of these two chiefs may be accounted for in the following manner. It often happens, that the names of those chiefs who have been celebrated for their wisdom, bravery, piety, or numerous progeny, have been alone handed down to posterity, and those of mediocrity set aside and forgotten. There is an instance of this with regard to Hasham\* and Abd-ul-Shams, who were both sons of Abd-ul-Manáf.

\* The great-grandfather of Muhammad.

The descendants of the former are still styled Ban-i-Hasham, whilst those of the latter are known as the Ban-i-Omeyah, from Omeyah the celebrated son of Abd-ul-Shams, and thus the father's name has been dropped altogether. In the same manner, Malik Abdál having acquired a great name for his bravery, equity, and generosity, and surpassed many of his predecessors in grandeur and dignity, his name has been handed down to us, whilst the very remembrance of those of little or no celebrity, is now altogether lost in oblivion. This is the great cause of the confusion which often takes place in the geneological histories of different tribes and people, and hence the reason why Malik Abdál has been called the son or grandson of Sharkabun.

Malik Abdál thus became chief of the Afghánah—Sarbans, Ghar-ghashits, and Tabrins. During his reign the people began to pay attention to agriculture, and the lands about Káseghar were brought under cultivation. Abdál, who was famed for his bravery, followed in the path of his ancestors by making war on the people of the surrounding parts, in the plundering of whose property his followers acquired great wealth. A number of the infidels who dwelt in the vicinity of the Káseghar district, was also at this time converted to the Muhammadan faith. At length the Afgháns having no infidels to plunder, and insufficient land to yield them a subsistence, began to take service under the Ghaznivid Súltáns, from whom they obtained the district of Bagrán, now known as Pesh'-áwer, as a feudal fief.\* Of the countries to the north, such as Suwat,

\* The account contained in the *رياض المحبت* (Gardens of Friendship) by Mahábbat Khán differs in some respects from the preceding narration. He says, "up to the time of the Prophet of Islám, the descendants of Afghánah dwelt in the Salmán mountains, at which period Kais was their chief. He subsequently went to Arabia to do homage to Muhammad, taking with him eleven persons of his tribe, who with himself became converts to the new faith.

"He returned to his native land, but in the following year he again returned to Arabia with seventy of his tribe, and joined the followers of Muhammad a short time previous to his attack on Mekka, in which affair, and the subsequent operations, Kais behaved so well, that the title of Abd-ur-Rashíd was conferred on him, and he soon after returned to his home.

"After the death of Muhammad, Kais Abd-ur-Rashíd, with a number of his people followed the two succeeding Khalifs in their wars; and when the Khalif

and Bajawer, which were in the hands of the Kafirs, they got possession by force of arms. They also obtained grants of land at Ghazní and Kábul, from Súltán Máhmúd and his successors, and by degrees began to emigrate from the neighbourhood of Kaseghar, and

Osmán determined on the conquest of Khorásán, he requested Kais to obey the orders of Abd-ullah bin Æámir bin Kárez, who had been appointed to head the expedition. This chief had been directed to settle the Afghán tribe with their families, after the conquest of that province, between it and Hindústán, that they might become a barrier against invasion from the latter country. Kais assisted in the conquest of Khorásán, after which, the tract of country lying between Hirát and Kandáhár was bestowed on him and his tribe, subject to the governor of the province.

"At the period of the struggles between the Omeýahs and Abbásís, which ended in favour of the latter, the Government of Khorásán was administered by Hújáj bin Yúsuf, Sakafí, who sent an expedition into Hindústán, under his nephew Kásim bin Muhammad bin Yúsuf, Sakafí, who was accompanied by a strong body of Afgháns. They advanced through the district of Roh,\* and at length reached Múltán, after annexing the former district, which was made over to the Afghán tribes, with directions to keep under the refractory Hindús. From the occupation of Roh by the Afgháns, they obtained the name of Rohillas.

"Sabuktagín the founder of the Ghuzniwíd dynasty, and father of the great Muhammad, entertained a number of Afgháns in his army. When that ruler died, Ismaíl his son by the daughter of Alta'kin, the owner of Sabuktagín, for the latter was originally a slave, succeeded his father, but Muhammad, another son by the daughter of the chief of Zábúlistán (Kábul) opposed him in the succession, and a civil war ensued between them. The Afgháns who were dependent in some measure on that chief, joined his son-in-law Muhammad, who defeated Ismaíl, and confined him in a fortress.

"In gratitude for this effectual aid on the part of the Afghánah, Muhammad gave his sister in marriage to Sá'ho the chief of the tribe, by whom he had three sons—Salár, Mas'oud, and Ghází, who are buried at Baráj.

"When Sultán Muhammad set out on his expedition against Samnáth in Gúzerát, he took with him a body of Afgháns. Several times during the siege of that stronghold, fortune seemed to incline against the Muhammadan arms, but at length the Afgháns were brought to the front, who having fastened the skirts of their garments together, attacked the Hindús with such fury that the latter were entirely defeated, but not until the victors as well as the vanquished had sustained immense

\* The Be'úchis and other inhabitants of the Deráh Ghází Khan, and those of the southern part of the Deráh Ismaíl Khan districts, speak of the mountain range immediately west of the Indus, to the southern boundary of Afghánistán, by this name.



settled in those places they considered best suited to themselves. Up to the time of Malik Abdál, the whole of the tribes considered and obeyed him as their head and chief, but now each tribe and village began to choose their own governors, and ceased to pay that respect and obedience to his authority, which they formerly did; in fact they fell headlong into the slough of arrogance and presumption.

Abdál was succeeded by his son Malik Rajar. This prince—a second Nimrod—was passionately fond of the sports of the field, in which he spent the best part of his days and nights. He was blessed with four sons—Æsau, Nur, Khokai, and Makou, the first of whom, a God-fearing and just personage, succeeded him in the chieftainship: the others gave name respectively to the Núrzo'e, Khokari, and Makou tribes.

The remainder of the Abdális, and other clans, which had up to the present period continued to dwell in the Káseghar district near the Takht-i-Súlímán, finding it too small to support so many families, began, in the hot season, to migrate with their flocks, to the neighbourhood of Kandáhár, returning again to their old haunts at Káseghar in the winter.

Malik Æsau had three sons, Zírak, Is'hák, and Alí. On his death he bequeathed the turban of authority to Zírak, his sword to Is'hák, and his carpet for prayer to Alí. From these two latter, the Is'hákzo'e, and Alízo'e branch of the Abdális are descended, and from them is also descended the only one of the twelve *astánahs*, or families who are devoted to the priesthood, as already referred to.

Zírak, who was a wise and able chief, governed his tribe with energy and ability. He completely rooted out the crimes of impiety, adultery, and dishonesty, which appear to have been but too prevalent at the period in question.

The five tribes which have been already mentioned as the Abdáli clan, viz; Is'hakzo'e, Alízo'e, Núrzo'e, Khwagání, and Makou, are known as the Panjpa'o branch.

My own opinion is that Malik Abdál was a cotemporary of Súltán

loss. In reward for this important service, the 'Breaker of Idols,' bestowed on each of the Afgháns the Túrki title of Khán: their former title of Malik was derived from Malik Tálút." *Ri'áz-i-Mahábbat.*

Máhmúd, Ghaznívide, Malik Zírak of Shah Rukh Mirza, son of Amír Timúr, Gúrgání, between whose reigns there is a period of some three centuries. As has been already noticed, the names of the most celebrated chieftains can alone have been preserved by their countrymen, whilst those of less fame have sunk into oblivion.

The district of Rúdah and Káseghar, as before stated, not being of sufficient extent to support the great number of people, to which the Afgháns had by this time increased, Malik Zírak was induced to send an agent to Shah Rukh Mirzá,\* at Hirát, for the purpose of soliciting a grant of the districts round Kandáhár. This request was favourably listened to by the Sháh, and Zírak in consequence gave directions to the Abdáli, Barech, Tarin, Jamad, Ghalzo'e, Kákur, Kási, Bábur, and other tribes—who were more numerous than the extent of their lands could support—to proceed to Kandáhár and settle on the lands granted by the Sháh in that district. To each tribe a portion of land was given, in proportion to the number of families of which it consisted, and for which ground they had to pay a small tax to the Governor of the province.

Zírak had three sons—Popul, Bárak, and Alako, from whom have sprung the Populzo'es, Bárakzo'es and Alakzo'es. At his death Popul succeeded him in the chieftainship of the whole Afghánah people. Being a sagacious and intelligent chief, and endowed with the tact of government, he kept the whole of the tribes under subjection and obedience. They also were generally well satisfied with his government, but at the same time, those who showed any opposition to his authority, were punished by the Kandáhár Governors, and this tended still more to keep all under proper restraint.

Popul had also three sons—Habib, Bádú, and Aiyúb. The two former were by one mother, and the latter by another wife. Some also say that Aiyúb was the son of the first wife by a former husband.

Bádú was the ancestor of the Bádúzo'es, and Aiyúb of the Aiyúbzo'es. At length Popul suddenly finding his end approaching, sent for his children, and after giving them much good advice, and exhorting them to follow in the footsteps of their ancestors, departed this life, leaving the chieftainship of the tribes in the hands of his eldest son Habib.

\* The accomplished son of the great Timur.

The children of Afghána who had now become a numerous people, and had, up to this time, paid obedience to the authority of their chief, began to show symptoms of restlessness, and dislike to the yoke of Habib's supremacy. At length they commenced quarrelling amongst themselves, and the *khails* or clans of every village having declared themselves independent, set about nominating their own chiefs. All was uproar and confusion; the rich tyrannized over the poor, and the strong plundered the property of the weak; might was right, and villainy, impiety, and depravity reigned supreme.

Malik Habib endeavoured for a long time to stem this torrent of rebellion, and regain his lost authority over his people, but without success; and at length not one tribe remained on his side. The Taríns, Barechís, Ghalzo'es, Kákurs, Shíranís, and others, each set up one of their own tribe as pretenders to the chieftainship, raised the standard of revolt, and commenced a civil war. The life of Habib was spent in civil contentions, which were entirely without avail. He had three sons—Bámí, Ismáíl, and Hasan, from the two last of whom are descended the clans of Ismáílz'o'e, and Hasanz'o'e.

Bámí, who was of a mild disposition, and possessed of many excellent qualities, succeeded his father as nominal head of the Afgháns. Súltán Bahlol Ludhí, and his son Sikunder, emperors of Hindústán, were on friendly terms with him, and sent him from time to time various costly presents. This produced great envy in the hearts of the pretenders to the chieftainship, and they despatched agents with presents to these potentates. Their agents without being admitted to an audience even, were dismissed with the answer, that the Súltáns neither knew of, nor recognized any other head of the Afgháns than Malik Bámí. He had four sons—Sálih, Ali, Zaiyl, and Warukah. They were fathers of large families, and their names have been perpetuated in the separate clans, bearing their respective names.

Bámí died at an advanced age, and the shadow of chieftainship which now alone remained, descended to his eldest son Sálih, who became head of the Habíbo'e tribe, which consisted of the three smaller ones of Ali, Zaiyl and Warukah, just mentioned, who acknowledged and supported his authority. He was a man of great piety and generosity, and his threshold was never clear from the

crowds of poor, nor his table from the numerous guests. In his lifetime Shír Shah, and Salím Shah, who were of the Shorkhail branch of the Afgháns, sat on the throne of Delhi; and the friendship which had sprung up between his father and the Lúdhia Emperors, was renewed and kept up with the former princes also. At length the vicissitudes of fortune wrested the sovereignty from the grasp of the Ludhis, and placed it in the hand of the Moghal; but when Shír Shah in the year 951 of the Hijerah,\* sallied forth to regain the throne of his ancestors, the Afgháns assisted him with a powerful force of their countrymen, and Hindústan was regained. When the agents of Malik Sálíh presented his letter of congratulation to Shír Shah, the Emperor observed to his ministers and court, that Malik Sálíh was not only his own chieftain, but that his forefathers, from the time of Malik Afghán, were the chiefs of his forefathers also; and that the family of Malik Sálíh had no equal in rank amongst the whole of the Afghán tribes. Shír Shah, after thus acknowledging Sálíh as his head and chief, and treating his agents with great distinction, dismissed them with numerous presents for their master.

"At length in the reign of Sháh Tamásib, Sufawí, in the year of the Hijerah 965, on the night of Monday the 17th of the month Zú'l-hijjah; the bright orb of Saddo rose from the eastern horizon of the black goat's hair tent of Malik Sálíh, and diffused his refulgent beams on the surrounding world."

With the birth of Saddo, the ancestor of the great Ahmed Shah, Abdálí, the Introduction to the Tazkirát-ul-Mulúk closes.

Sir John Malcolm's words on the origin of the Afgháns are—"Although the right of the Afgháns to this proud descent is very doubtful, it is evident from their personal appearance, and many of their usages, that they are a distinct race from the Persians, Tartars, and Indians, and this alone seems to give credibility to a statement which is contradicted by so many strong facts, and of which no direct proof has been produced."

Sir William Jones was of opinion that the Afgháns are the Paropamisadæ† of the ancients, but this is very improbable, for it is proved by the statements of many authorities, besides that of the

\* A. D. 1544.

† See Quintus Curtius's Life of Alexander. Book 7.

work from which I have given an extract, that the Afgháns are not the aborigines of the country they at present inhabit, but have gradually advanced from the west of Asia, and it is not improbable, but that during the lapse of ages, they might have been forced from various causes, to emigrate from the districts in the vicinity of Jerusalem, as stated in the tradition I have quoted. The Seah-Posh Kafirs are in all probability the Paropamisadæ of the writers of antiquity, respecting whom, on some future occasion, I hope to offer some remarks.

According to the Makhzan Afgháni, after Feridún's victory over Zohák, the latter was subjected to such acts of tyranny, that his children fled for safety to the mountain tracts of Ghor, which at that time was only inhabited by a few scattered tribes of the Israelites, Afgháns, and others. If Jewish families could, at that period, have been inhabitants of Ghor, it is equally possible that the Afgháns themselves might have come originally from the Holy Land.\*

The mountain districts of Afghánistan heard not the "Allah Akbar" of the conquering Arabs, until the fourth or fifth century of the Hijerah, by which time the sun of their power had commenced to wave. Up to this time even, we find that the Kafirs or Infidels inhabited the mountain districts of Ghor, and continued to dwell there up to the thirteenth century of our era, when Marco Polo visited those regions.†

The Yúsufzo'e tribes, who now hold the whole of the districts to the north of the Lundy Sind, or Kábul river,‡ were even in the time

\* In the reign of Saosduchinus king of Babylon, called in scripture Nabuchodonosor the First (A. M. 3335. Ant. J. C. 669) the prophet Tobit, who was still alive and dwelt among other captives at Nineveh, a short time before his death, foretold to his children the sudden destruction of the city, of which at that time there was not the least appearance. He advised them to quit the city before its ruin came on, and to depart as soon as they had buried him and his wife. The Jews, at this time being captives, to follow the advice of Tobit, would have had in the first place to have escaped from Nineveh by stealth, and having accomplished this much, where could they hope to find a more secure retreat, than towards the east, and in the direction of the mountainous tracts now inhabited by the Afghán tribes? See Tobit C. XIV. V. 5-13.

† Travels of Marco Polo; Marsden's Translation. Book I. Chap. 22. pp. 122.

‡ *Lundy Sind*, in Pushto signifies the "Little river," in contradistinction to the *Abu Sind*, or "Father of rivers," as the Indus is termed.

of Báber but new comers, and in this, his statement agrees with the account in the *Tazkirát-ul-Mulúk*. In another place Báber mentions the people of Bajawer, as "rebels to the followers of Islám, and besides their rebellion and hostility, they followed the custom and usages of Infidels, while even the name of Islám was extirpated from among them."\* From this it appears that the people of the country had been converted to Muhammedanism, and relapsed again to idolatry, but were *not* Afgháns.†

Nowáb Allah Yár Khán, son of the Nowáb Háfiz Rahmat Khán,‡ in the preface to a lexicographical work of which he is the author, states, that "there are two divisions of the Afgháns, whose language also differs in many respects, so that the words used by some tribes are not known to, or understood by, others. They are termed Pushtún and Pukhtún and they speak the Pushto and Pukhto§ respectively. The former is the western dialect, having some affinity to the Persian, and the latter the eastern, containing many Sanskrit and Hindí words. The people who dwell about Kábul, and Kándahár, Shora'wak and Pishín, are designated Bar Pushtún or upper Afgháns from *بر above*; and those occupying the district of Roh, which is near Hind (India) are called Lar Pukhtún or lower Afgháns from *لر below*."

He describes Roh, about which has been, and still continues to be, great diversity of opinion, as "bounded on the east by Suwat and Káshmir, west by the Helmund river, north by Káshkár or Chitrál and Kafristán, and south by the river or sea of Bukker, called in Persian Nil-áb, (The Blue Water) and Nil'aow or Abá-Sin, (The Father of Rivers) by the Afgháns."

The author of the *Ferang-i-Jehúngirí* gives a somewhat similar account of it; "Roh," he says, "is the name of a range of lofty mountains, in length extending from Suwat and Bajour, to Síwní, which is in the district of Bukker in Sind, and from Hassan Abdál

\* Báber's *Memoirs*, page 248.

† "Although Bajour, Sewad, Peshour, and Hashnagar, originally belonged to Kabul, yet at the present time some of these districts have been desolated, and others of them entirely occupied by the tribes of Afgháns, so that they can no longer be properly regarded as provinces." *Ibid*, page 141.

‡ The author of the *Khullasat-ull-Ansáb*.

§ Merely in substituting sh for kh, z for g, etc.

(in the Sínd Ságur Doába, of the Panjáb) to Kándahár in breadth, and in this highland range the latter city is situated."

I have been told by Afgháns in the vicinity of Pesh'áwer, and other places, that their ancestors first came from a district named Ghwárf Margháb, which they said lies to the westward of Khorásán. This is, however, a mistake; a small village bearing this name, and the place referred to by them, is situated about mid-way between Kándahár, Shoráwak, and Girishk, which is one of the old seats of the Afghán tribes who now occupy the Pesh'áwer valley. Ghor, supposed to have been the original district of the Afghána, lies much to the north. It was from this latter place that the Ghoríán tribe issued in the year 1152. A. D. when they overturned the throne of the Ghazníwíd Súltáns.

The diversity of opinion regarding the origin of the Afghána, is not greater than that respecting their language, of which, at the time I write, with the exception of a small brochure by the late Major R. Leech of the Bombay Army, no grammar exists.\* I have just completed a grammar which, together with a dictionary in preparation, will, perhaps enable the learned both of Europe and India, to give a better, and more decided opinion than heretofore on the affinity of the Afghán language to those of ancient Asia.

Sir William Jones's opinion was, that the Pushto or Pukhto language has a manifest resemblance to the Chaldaic, but Professor Klaproth vehemently denies this, and states, that nothing whatever is known regarding this dialect; that neither in words or grammatical structure, is there the slightest resemblance between Pushtú and any Semitic language, and that it is unquestionably a branch of the great Indú-Germanic division of languages.†

The Baptist Missionaries of Serampúr again consider the Pushto and the Belúch‡ languages, to form the connecting link, between those of Sanskrit, and those of Hebrew origin.§ M. Adelung, in his

\* Since writing the above, Captain Vaughan of the Bengal Army has published a Grammar.

† It is to be hoped the Professor will change his opinion now, as regards the latter part of this sentence.

‡ The Beluchki is a mixture of Persian, Sindhi, Hindí, and Sanskrit, with some original words.

§ They also notice the numerous pure Hebrew roots to be found in Pushto.

Mithridates vol. 1st, page 225, considers Pushto an original and peculiar dialect, but at the same time acknowledges his acquaintance with it to be very slight.

Mr. Elphinstone, in his work on Kabul, vol. 1st, page 302, with reference to the Afghánian language, considers that its origin cannot be easily discovered. He remarks, "a large portion of the words that compose it, as also most of the verbs and particles belong to an unknown root, and in this portion are included most of those words, which from the early necessity for designating the objects they represent, must have formed parts of the original language; yet some of this very class belong to the Zend and Pahlavi, such as the terms for father and mother, sister and brother." He also further states, that out of two hundred and eighteen Pushto words, not one had the smallest appearance of being deducible from any of the Semitic languages, but that a resemblance (five out of one hundred and ten words) can be traced between it and the Kúrdish, considered to be an Indú-Germanic tongue.

One of the most decided proofs against the erroneous idea that the Afgháns are the aborigines of the territory they at present inhabit and that the Pushto is the original dialect of those countries, consists in the facts brought to light in the decyphering of the Bactrian, and Indú-Scythian coins. M. Lassen in his interesting and erudite work\* on this subject, very truly observes; "I indeed know that some have pretended to recognize the Afgháns in eastern Kábul, even as early as Alexander's time; not so Mr. Elphinstone,† who rather proves their immigration into Kábul at a much later period. This conjecture has originated with professor Wilken‡, who thinks he recognizes the Afgháns in the Assakanes. If these were indeed Afgháns, the Afghán language would have been spoken throughout Kábul, and the language of the coins must be the source of the Pushto. Without observing, that neither ancient authorities nor modern Afghán history§ admit or require this supposition, the cor-

\* Points in the history of the Greek and Indú-Scythian Kings in Bactria, Kabul, and India. Page 116.

† Account of Kábul. Volume II. pp. 10, 33, 44, 50 & 56.

‡ Abhandlg. der Berlin, Acad. 1818-19 p. 261.

§ Báber does not mention any thing about Afgháns at Kábul, when he took that city.



rect assertion of the learned academican himself, that the Afgháns belonged to the Medo-Persic tribe, is at variance with it; the Asakanes inhabited a country, where even in the 7th century A. D. an Indian language was spoken."

As the learned professor urges—if the Afgháns were the aborigines of the countries they at present inhabit, the Afghánian language must, as a matter of course, have been generally spoken. Had such been the case, the language on the coins, must have been the source of Pushto, but no similarity whatever exists between them.

The Afgháns, although subdivided into numerous tribes, are undoubtedly one race, and speak one original language. Had they been the aborigines of the country at present known as Afghánistán, we must have heard something of them from ancient writers, for we find that even in the time of Herodotus, Darius had sent an exploring expedition under Scylax of Caryanda and others as far as the Indus.\* That the whole of the regions west of Jelálábád or even as far west as Kábul, were peopled by a Hindú race, most ancient writers agree to, as also that they were of different tribes, and spoke different languages. Herodotus says—"There are many nations of Indians, and they do not speak the same language as each other; some of them are Nomades, and others not."†

Again the father of History observes. "There are other Indians bordering on the city of Caspatyrus and the country of Pactyica, settled northwards of the other Indians, whose mode of life resembles that of the Bactrians."‡ The country here referred to, the same as Scylax and his companions started from on their voyage down the river, is the present district of Pakhli, north of Attak. The Indians are in all probability the ancestors of the race who still occupy that district, the Suwatees, and the people of Astor and Gilgit.

\* "A great part of Asia was explored under the direction of Darius. He, being desirous to know where the Indus, which is the second river that produces crocodiles, discharged itself into the sea, sent in ships both others on whom he could rely to make a true report, and also Scylax of Caryanda. They accordingly, setting out from the city of Caspatyrus and the country of Pactyice, sailed down the river towards the east and sunrise to the sea." Melpomene IV. 44.

† Ibid. Thalia. III. 98.

‡ Thalia, III. 102.

It is therefore evident that the Afgháns have immigrated into their present territories from the westward,\* and that the aborigines, the Seah Posh Kafirs, or Black-clad Pagans, the Suwatees, and the people inhabiting the hills to the north-east of Suwat, on the one side, and possibly the Belúchis and Jats on the other; have been forced by the gradual advance of this powerful race, to move to the north-east and south-west respectively.

\* The empire of the Great Cyrus extended, according to the best authorities, from the Ægean to the Indus, and from the Euxine and Caspian to Ethiopia and the Arabian sea. As it was customary to transport a whole tribe, and sometimes even a whole nation from one country to another, and as the Jews were ever a stiff-necked race, is it not possible, that the Great King may have transported some of the most troublesome amongst them to the thinly-peopled provinces of the east, where they would be too far away from their native land and captive countrymen to give trouble in future? Or, as I have remarked in another place, is it not probable as well as possible, that those of the Jews who could effect their escape, might have fled eastward, preferring a wandering life in a mountainous country, with independence, to the grinding tyranny of Cyrus's successors and their Satraps? In fact there was no other direction to which they could have fled, except towards the north, inhabited by the Scythians who would have massacred, or at least made slaves of them or sold them as such; or eastward, which being mountainous and but thinly peopled, was likely to afford them a permanent and secure retreat. According to Níámút Ullah, Zohak's children, to escape the exterminating vengeance of Feridún, fled for refuge to the Kohistan of Ghor, and settled there; and at his time, its only inhabitants were some scattered tribes of the Israelites, Afgháns, and others.

There are a number of Jews to be found in the south-west parts of India, and in the Bombay Army there are a great number. Where did they come from? and when did they come?

Again in the 5th year of Darius (A. M. 3488; Ant. J. C. 516.) Babylon revolted and could not be reduced until after a siege of twenty months. It is therefore probable that the Jews, of whom a considerable number remained at Babylon, went out of the city before the siege was formed, as the prophets Isaiah and Jeremiah had exhorted them long before, and Zachariah very lately in the following terms: "Thou daughter of Zion, that dwellest with the daughter of Babylon, flee from the country and save thyself." Isaiah. xlviii. 20. Jeremiah l. 8 li. 6, 9—45. Zachariah ii.

It also appears that Ochus son of Artaxerxes Memnon, carried a number of Jewish captives into Egypt, and many others into Hyrcania, where he settled them on the coast of the Caspian A. M. 3653, Ant. J. C. 351; might not some have been sent eastward also? See Solin. C. 35, Euseb. in Chron. etc.

I formerly entertained an idea that some affinity might exist between Pushto and the language of that strange people, the Gypsies, but subsequent enquiries have convinced me to the contrary; and I find that no trace of similarity exists between them. This may also be seen by reference to a comparative table of languages which I shall shortly publish.

Whether the Afghánian language be a dialect of the Semitic, of Zend or Pihlavi origin, or of the Indian stock, I will leave for others better qualified to decide. Before entering into any investigation on the subject, it must be borne in mind, that "no efforts of the learned, can ever so far alter a language, as to deface every line of resemblance between the speech of the present day and that of even the remotest ancestry: nothing but the absolute extirpation of the aboriginal natives can apparently accomplish so singular a revolution."\* As an instance of this, we have merely to examine the present language of Persia, and the different dialects of the continent of India; or for a still more convincing proof, to look into the Gothic and Celtic original of the modern European languages, amidst the polish and refinement of the Greek and Latin.

Before bringing these rambling remarks to a close, I must notice a few of the most striking peculiarities of the Pushto language, which will, in some measure, serve as a guide in investigations as to its origin and affinity to the other dialects of the Asiatic continent. It will however be well, first to point out the best and most effectual method of ascertaining the *real* affinity of oriental languages.

Baron William Humbolt, in an essay on this highly important subject remarks; "I confess that I am extremely averse to the system which proceeds on the supposition that we can judge of the affinity of languages merely by a certain number of ideas expressed in the different languages which we wish to compare. I beg you will not suppose however, that I am insensible to the value and utility of the comparisons: on the contrary, when they are well executed, I appreciate all their importance; but I can never deem them sufficient to answer the end for which they have been undertaken; they certainly form part of the data to be taken into account in deciding on the affinity of languages, but we should never

\* Richardson's Dissertation, etc.

be guided by them alone, if we wish to arrive at a solid, complete and certain conclusion. If we would make ourselves acquainted with the relation between two languages, we ought to possess a thorough and profound knowledge of each of them. This is the principle dictated alike by common sense and by that precision acquired by the habit of scientific research.

"I do not mean to say, that, if we are unable to attain a profound knowledge of each idiom, we should on this account entirely suspend our judgment: I only insist on it that we should not prescribe to ourselves arbitrary limits, and imagine that we are forming our judgment on a firm basis, while in reality it is insufficient.

"But further, I am convinced that it is only by an accurate examination of the grammar of languages, that we can pronounce a decisive judgment on their true affinities.

"If two languages, such for instance as the Sanskrit and the Greek, exhibit grammatical forms which are identical in arrangement, and have a close analogy in their sounds, we have an incontestible proof that these two languages belong to the same family.

"The difference between the real affinity of languages, which presumes affiliation as it were among the nations who speak them, and that degree of relation which is purely historical, and only indicates temporary and accidental connexions among nations, is, in my opinion, of the greatest importance. Now it appears to me impossible ever to ascertain that difference merely by the examination of words; especially, if we examine but a small number of them.

"But whatever opinion may be entertained with respect to this manner of considering the difference of languages, it appears to me at all events demonstrated: First, that all research into the affinity of languages, which does not enter quite as much into the examination of the grammatical system as into that of words, is faulty and imperfect; and, Secondly, that the proofs of the real affinity of languages, that is to say, the question whether two languages belong to the same family, ought to be principally deduced from that alone; since the identity of words only proves a resemblance such as may be purely historical and accidental."

There are nine letters of the Arabic alphabet which never occur in pure Afghānīan words,—ث, ح, ذ, ص, ض, ط, ظ, ع, غ, and ف, and

therefore the language really contains but twenty-nine letters, including five peculiar ones, to which, after a careful comparison of six hundred alphabets, I find that there is no similarity as to form or sound, either in Arabic, Zend, or Sanscrit, but characters similar in sound are contained in most of the Semitic, and some Tártarian dialects. The Pushto letters with the corresponding ones in the languages referred to are as follow.

𐎧 *ts* or *tz*, pronounced *tse* or *tze*, has an equivalent in the Chaldaic 𐎶 *ts*, Hebrew 𐤛 *tsóde*, Samaritan 𐤌 *tsáde*, Syriac ܛ *tsode*, Ethiopic and Amharic ጸ *tza*, Armenian Ձ *tza*, Palmyren 𐤕 *ts*, Phœnician 𐤕 or 𐤖 *ts*, Punic 𐤕 *ts*, Kufic 𐤕 *ts*, Georgian 𐏃 *ts*, Mongolish 𐠣 *ts*, Mandchú 𐠤 *tsa*, Thibetan 𑄧 *ts*, Albanian 𐌆 - 𐌇 *ts*, Corean ㅈ - ㅉ *ts*, and the Japanese ㄗ - ㅅ - ㅆ - *tse*.

𐎡 *dz* or *ds*, pronounced *dze* or *dse*, similar to the Hebrew 𐤎 *dsain*, Aramæic 𐤌 *ds*, Palmyren 𐤌 *ds*, Phœnician 𐤌 *ds*, Kufic 𐤌 *ds*, Syriac ܕ - ܕ *dzain*, the Assyrian cuniform 𐡥 - 𐡦 *dz* or *ds*, Armenian Զ *dza*, Greek ζ *zeta*, Georgian 𐏃 *ds*, Mongolish 𐠣 - 𐠤 *ds*, and Corean ㅈ - ㅉ *ds*, Mandchú 𐠤 - 𐠥 *ds*, Japanic ㄗ *dz*.

𐎶 *urray*, for which with perhaps the harsh *rh* of the Armenian ր, there is no equivalent in any of the known dialects of the old world. Some persons and among them Major Leach, have considered the Sanskrit lingual ॠ as similar in sound, but it is merely necessary to hear it pronounced by an Afghán mountaineer to convince any one of the total difference, indeed, it is almost impossible to give a proper idea of its sound in writing. Kufic 𐤕 *r*, is like it in form. 𐎶 *khin* bears some similarity to the 𐎶 - 𐎷 *k'ch* of the Chaldaic, and with this exception, no sound like it is to be found amongst the letters of the six hundred alphabets before referred to.\*

𐎶 or 𐎷 *'urrún*, is a combination of the sound of *s'urray* and 𐎶 *nún*, the latter nasal. It is quite impossible to acquire the real pronunciation except from an Afghán mouth when using the word 𐎶

\* See Die Schriftzeichen des gesammten Erdkrieses. Vienna. 1851, also, Alphabete orientalischer und occidentalischer Sprachen zum Gebrauche für Schriftsetzer und Correctoren. Leipzig. 1850.

the *eye-lash*, or نَرِي stone. The ن 'rún of the Sindian language is something like it.

Pushto also, like the Semitic dialects, of which family I am inclined to consider it, has the *t'h* with a strong aspiration to which sound the Persians have an unconquerable antipathy; indeed their mouths seem to be so formed as to be unable to utter it. Like the Jews and Egyptians, as well as the Arabs, the Afgháns uniformly give the hard sounds, *t'h*, *d'h*, *ds*, *dtz*, *dz*, etc., to those characters which the Persians have ever softened to *z* and *s*. The pronunciation too, is somewhat difficult on account of the use of several gutturals, and the combinations of such letters as خك, كخ, شب, etc., which are difficult to enunciate.

In harshness of pronunciation, and in the declensions of its nouns, it bears great resemblance to the Zend and Pehlavi, and like the former language, can be, and often is, written in old works, on which alone we can place dependence, by distinct letters in the body of each word, instead of introducing the short vowels. Of the affinity of the Zend and Sanskrit at present there is no doubt, but the Pehlavi appears to have a greater affinity to the Arabic, and to differ little from the present language of Persia.\*

In Arabic and Persian it is impossible to sound a consonant which may be the first letter of a word, without the aid of a vowel, whilst in Pushto there are numbers of words beginning with a consonant immediately followed by another; as, شپه *shpah*, night, رڼه *rwadz*, day, ځه *ghlá*, theft, پښتانه *khkatah*, below.

The vowels and consonants used in Pushto have the same powers as those of the Arabic, Hebrew, and other Semitic dialects. Like them it has two genders—the masculine and feminine, but the former have a dual form, which is wanting in the latter. In this respect the Afghánián also differs from the Zend and the Sanskrit, but agrees with the Pehlavi, from which the modern Persian is derived. In common with the Hebrew, Arabic and Persian, it has the peculiar separable and inseparable pronouns, the latter being

\* Sir William Jones has stated, that "having compared a Pehlavi translation of the inscription in the Gúlistán on the diadem of Cyrus, and from the Pázend words in the Ferang-i-Jehangíri, he became convinced that the Pehlavi is a dialect of the Chaldaic."—*Asiatic Res.*

invariably attached to some preceding word, whether a noun, verb, or particle. When attached to nouns they signify possession or propriety, and with intransitive verbs in the course of conjugation, are used in the place of personal pronouns, and with transitives point out the objective case.\* This is also a peculiar feature of the Sindíán language, which has several letters in common with Pushto besides its own peculiar ones. The inflexions of the Afgháníán verbs too are formed, inflexions are conjugated according to the Arabic and Hebrew system, with two original tenses only—the *mázi* or past, and the *muzáræ* or aorist, the past participle being used in the construction of the compound tenses, with the aid of the auxiliary, *to be*. Another peculiarity is, that the intransitive verbs agree in gender with the nominative, whilst the transitives are governed both in gender and number by the objective case. In many respects the Pushto syntax agrees with that of the Hebrew, and I have no doubt but that much greater affinity will be found to exist between them, if compared by any one well versed in the latter language.

The Pushto language is spoken with considerable variation in orthography and pronunciation, from the valley of Pishín south of Kandá-hár, to Káfristán on the north; and from the banks of the Helmand on the west, to the Attok, Sindhu, or Indus on the east—throughout the Sama or Plain of the Yusufzo'es, the mountainous districts of Bajawer, Pánjkorat, Suwat, and Bunir, to Astor on the borders of Little Thibet—an immense tract of country equal in extent to the entire Spanish peninsula.

The numerous convulsions to which the country of the children of Afghána has been subjected for the last seventy or eighty years, have necessarily affected their language also; hence the great variation observable in the orthography and mode of writing of modern Pushto works. On this account, no dependence whatever can be placed on any manuscript of later date than the reign of the founder of the Durání empire—Ahmed Shah Abdáli—authors—for it is almost impossible to find two copies of one author, unless written by one person, agreeing on these essential points. I have in my

\* See Hebrew Grammar by Prof. Lee, p. 80, Art. 153, p. 260, Art. 220. London. 1827.

† *Kor* is the Pushto for house, and *Pánj* the Persian for five.

possession a rare prose work, which was written in the reign of the Emperor Aurengzeb, which I picked up in a most out-of-way place,—a pawn shop at Bombay. The mode of writing and orthography in it, I have generally adopted, together with that of the Makhzan Afgháni, in my grammar above alluded to.

The assistance which I have derived from a knowledge of the dialects of the neighbouring territories, to six of which I have devoted many years, has been very great, indeed more than I can well express. It has enabled me to trace words of Arabic, Persian, Túrki, Sanskrit, and Hindí origin, greatly garbled in orthography, and vitiated in pronunciation, which a person unacquainted with them in any way, would in all probability set down as pure Pushto.

As an example of this, I will mention one instance alone. M. Klaproth in his apparent eagerness for classing the Belúch language, which is a mixture of Persian, Sindhi, Panjábi, Hindí, and Sanskrit, amongst the Indú-Germanic family of tongues, commits an error, from, I fancy, ignorance of the Persian language. He gives the following table :\*

<i>Beluch.</i>	<i>German.</i>	<i>Latin.</i>	<i>Greek.</i>	<i>English.</i>
Shash	Sechs	Sex		Six
Hapt		Septem	Hepta	Seven

Now the Persian for six is شش *shash*, and seven is هفت *haft*, which two words,—to all appearance have a greater affinity to the Belúch words here mentioned, than to either German, Latin, Greek, or English ; in fact they are precisely the same words, for ف is used for and pronounced پ indiscriminately, and would be written exactly the same in both languages. If we consider that Belúchistán is merely separated from the Persian province of Kirmán by a range of mountains, the similarity is naturally accounted for, without leaving Asia for that purpose, as the learned Professor appears to have done—“*Ea sub oculis posita negligimus : proximorum incuriosi, longinqua sectamur.*”

Unlike most Eastern nations, the Afgháns appear to regard women in a great measure on an equality with themselves, in this world at least ; and the latter generally receive some sort of education.

\* I am indebted for this to Thornton's *Gezateer*.



Some of the Afghán females of the higher class, are famous for their knowledge of Pushto which they read and write. The daughter of the late Dalíl Khán, Arbáb, or chief of Torú,\* near Pesháwer, is celebrated for her learning, and general proficiency in the Afghán language. Pesháwer, some fifty or sixty years since, was one of the principal seats of Muhammadian learning, and by many was considered a more learned city than even Bokhárá itself.

The custom is for boys and girls of from five to twelve years of age to go to the same school. After learning the letters they immediately commence reading the Korán in Arabic, but of course without understanding it. On its completion they begin to read some Púshnú work usually a commentary on the Korán, or an explanation of the rites and ceremonies of their faith, such as may be found in the work entitled Rúshid-ul-Ay'án, or some such religious subject. After the twelfth year, the girls either attend a dame's school, or, if their parents can afford it, are taught at home. Sometimes boys under twelve years of age, go to a dame's school with grown up girls of fifteen and upwards; but this custom is only prevalent at a distance from towns, as in most large places there are separate schools for males and females. The scholars either pay a small sum monthly to their teacher, or make him a present after having completed the perusal of the Korán, according to the position and means of their parents. Amongst some tribes a portion of land is allotted to the Mulla or Priest, who also acts as village school-master.

The Afghán language, taking all things into consideration, is by no means poor in literature. There are numerous poets, of whom Abd-ur-Rahmán who flourished in Aurengzeb's time, is perhaps, the best known and most generally esteemed. He was a Mullá or Priest, and his writings, which are of a religious character, are collected in the form of a Dewán—the form in which most of the poetical works are arranged.

The next most popular poet is Khushbál Khán who was chief of the powerful clan of Khattak in the time of the Emperor Aurengzeb,

\* Torú, or Tolú, is a town or cluster of villages in the Yúsufzai's country, about eleven miles north of Nulshaira, and containing about 5000 inhabitants.

and passed his life in struggling against the oppressive power of that monarch. The following verse from a poem written during his confinement in the fortress of Gwalior by the Emperor, is characteristic of the man.

Cheer up then heart ! I have by me,  
A healing balm for every throe—  
That Khúshhál Khán's an Afghán true,  
Aurengzeb's mortal foe.\*

Khushhál was also author of a History of the Afgháns, which work is now very rarely obtainable, and of a translation of Pilpay's Fables (the Anwári Soheli of the Persiau) entitled *E-yár Dánish*, or the "Touchstone of Wisdom. He also wrote a small volume on the forms of prayer, and other religious matters.

The poems of Ahmed Shah, Abdáli, the great founder of the Durání monarchy, and conqueror of the Múráthi host at Paníput, are principally in an amorous and metaphysical strain, and contain a number of difficult Arabic words. His poetry is highly esteemed, perhaps more so, than its merit demands.

The next author to be noticed is Mullá Abd-ul-Hamíd who flourished in the time of Timúr the son and successor of Ahmed Shah. His odes which are mostly of an amorous or moral tendency contain many fine sentiments. He is the Shaik Saadí of the Pushto, and I must say, that I prefer his works to any of the others. His works are entitled, *Dur-wo-Marjún*—Pearls and Corals.

Futtih Khán, Yusufzoe,† surnamed Mirzá, the next poet in point of popularity was a Súfi, and his works are a mass of mysticisms. He served in the wars of Aurengzeb in Guzerat and the Dekkan in 1686 and the following years.‡

Kasim Ali Khán of the notorious tribe of Afrídí, is the author of a *Dewán*, but his odes also bear the stamp of mysticism. He was born at Furakábád in India, in the time of Nowáb Muzaffar Jung,

\* I regret that want of space will not allow me to give the poem entire.

† Some say he was of the family of Báízíd (Báyízíd) Ansárfi, the founder of the Roshnián sect, called Pír Tárek or Saint of Darkness, by Akhund Darweza.

‡ I have in my possession the copy of his works which belonged to the Hon'ble Mr. Elphinstone.

and according to the account given of himself in one of his odes, he was acquainted with Afghání, Arabic, Túrki, Persian, Hindi and a little English. He has devoted one entire ode to the abuse of the English, just arrived in India, whom he calls "a nation of shop-keepers, who in Hindustán have turned into soldiers."

The romantic and interesting poems of Saif-ul-Mulúk and Badrí Jamál, by Gulám Muhammed, and Bahrám Gur, by Fy'áz, must not be overlooked. The authors who are but little known, are said to have flourished in the seventeenth century, which appears to have produced most of the Pushto authors.

The other poetical works most generally known are, *The Tale of Súltán Jumjumah* by Emám-ud-Dín, *Mæraj Nameh* by Gulám Muhammed, *Rashíd-ul-By'án* by Akhund Rashid, *Mukhammas* of Abd-ul-Kádir, *Majmúeat-i-Kándahári*, and some others of less note.

The prose writings are numerous, but with the exception of the romantic story of Adam Khún and Durkháuí mentioned by Mr. Elphinstone in his "Account of Kábul," and a few others, they are mostly on divinity. The principal are, the *Fawá'id-ush-Sharri'æa*, written by Akhund Kásim in 1560; *Makhzan Afghání* by the celebrated Akhund Darwezah\* who lies buried at Pesh'áwer; the works of Bábu Ján, said to have been a converted Seah Posh Kaffir who again relapsed; the *Jung Nameh* containing the history of Hussan and Hussain, by Gulám Muhammed; *Núr Nameh* by Ján Muhammed; *Gúlistán-i-Rahmat* by Nowáb Muhammed Mustajib Khán in 1800; *Tafzír*—a translation from the Koran; *Hazár Masá'il*; *Hiyát-ul-Mumínín*; *Akhír Nameh*: and several others.

Besides the original Afghán writings, there are also numerous translations from Arabic and Persian authors, both poetical and prose. Amongst those which have come under my own observation are, the *Gúlistán* of Saadi, translated by Amir Muhammed, Ansári; Yúsuf and Zulikhá of Jámí, by Abd-ul-Kádír; *Majuún* and *Laila* of Jámí,

\* Professor Dorn in his *Chrestomathy* states that Akhund Darwezah was the first author who composed in the Afghán language, but he neither states how he has arrived at this conclusion, nor his authority for such a statement. In the same manner he considers Khushhá Khán to be the author of *Adam Khún* and *Durkháuí*, but neither the one nor the other is actually known.

by Bai Khán of Bunír; the *Kasídah* Suri'ání; and the *Kasídah* Bardah by Akhund Darwezah.\*

There are two valuable lexicographical works, the *Rí'az-ul-Mahábat* (Gardens of Friendship) by the Nowáb Háfiz Mahábbat Khán, compiled at the request of Sir George Barlow in 1805-6. It is an extensive work of about 700 pages small folio, but is chiefly devoted to the conjugation of the Afghán verbs, which are exceedingly difficult from their irregularity. The author however was a native of Hindústán, and many peculiarities regarding the verbs and tenses, have been omitted. The vocabulary is valuable. The other work entitled *E-ajá'ib-ul-Lughat* (Curiosities of Language) was written about the year 1803, by Nowáb Alláh Yár Khán of the Barech tribe who was also a native of India. The work contains 640 pages of 17 lines to a page.

Kasim Ali Afrídí, in one of his odes, besides the authors already mentioned, gives the names of several others—Dowlát, said to have been a Hindú, Meher Ali, Sikunder, Ashráf, Arzáni, Mukhlis, Karim Khán, Kázim Khán surnamed Shaidah, Alláh Dád, Karím Dád, Fázil, Latarr, and Meher Shah, but they are little known.

There is a host of ballad writers, and some of their compositions, sung by the wandering minstrels are very spirited, and put me in mind of those of our own land. During my residence at Pesh'áwer I had several of them written out. The following is a specimen of one which I have attempted to turn into English ballad style, re-

\* The so-called translation of the Old and New Testaments made by the Serampore Missionaries in 1818, bears a very slight resemblance to the sacred writings; in fact it is quite ridiculous and quite painful to read. I will merely give one specimen, the well known verse from the Sermon on the mount—"Judge not, that ye be not judged." the Pushto is in the following terms انصاف مكوئې د پاره د دې په انصاف كړي شوي به نشيئ *Do not justice unto any one, lest justice shall be done unto you ! ! ! !* Is this Christian doctrine? verily, if the Infidels are to judge of our religion from such translations as this, it is not to be wondered at that they should scoff at, hold our faith in ridicule, and call us Káfirs or Blasphemers. It is quite evident that in making this translation the English has been merely transposed for the Pushto without the slightest consideration as to difference of idioms, style, and arrangement of the languages. I trust the other translations of the Scriptures are better than the Pushto one.

taining in some measure the metre of the original. The translation is almost literal.

*The Fight at Nohshaira.*

The battle of Nohshaira was fought in 1823, between the Afgháns under Sirdár Mahommed Azím Khan, Bárakzo'e, brother of Dost Mahommed Khan, and the Seiks under Runjít Singh, in which Abbás Khan Khattak was slain, besides a host of Yusufzo'es.

In misery and grief I'm plung'd,  
By ruthless Fate's decree ;  
Alas ! that from its cruel laws,  
There's no escape for me.

What shall I say of Abbás Khán,  
That Khattak chief so bold ;  
At his sad fate I'm sorely griev'd,  
And that by me 'tis told.

He first did march to Wuzír Bágh,\*  
Where cypresses do wave ;  
And there he muster'd all his clan,  
They were like lions brave.

He from Pesh'áwer then did start,  
For Azím Khán to fight ;  
And with five hundred Khattaks true,  
He reach'd Nohshair that night.

\* The Wuzír Bágh or Minister's Garden lies outside the city of Pesh'áwer to the south. It contains a residence, and was remarkable on account of the number of cypress trees it formerly contained. The garden was laid out by Sirdár Futtih Khan, the celebrated Wuzír of Mahommed Shah, and the brother of Dost Mahommed Khan, Bárakzo'e at present ruler of Kábul. The garden has since been chiefly occupied by the other brother Sultán Mahommed Khan, and his numerous Hárem.

When morning dawn'd, the Seiks advanc'd,  
The Afghán host to crush ;  
But Gházis\* they, on Nának's sons'†  
Did like a torrent rush.

On Khaiber's heights, when rains do pour,  
And wintry blasts do blow ;  
The little rills, to torrents swell'd,  
All Jamrúd's plain‡ o'erflow.

That day they kill'd of Singhs enough,  
Of heads to raise a dome ;  
But 'twas decree'd Nohshaira's plain,  
To them should be a tomb.

At eventide, the chieftain's steed,  
Fell' midst a heap of slain ;  
By night, his band, oh ! where were they ?  
Dead on the bloody plain !

Night clos'd round him, still he fought,  
All faint and out of breath :  
A Houri's§ hand the Sherbet gives,  
The Martyr meets his death—

To spare his life, the Seiks they did  
Pledge every sacred word :  
No Heav'n they dread—deceitful foes !—  
They put him to the sword.

\* Ghází—one who fights against infidels : a gallant soldier.

† Nának—the name of the Saint of the Seiks and the founder of the sect.

‡ " Jamrúd's plain"—" After heavy rains in the mountains, the rivelets. swelled to torrents, rush from the hills with violence, and carry every thing before them "

§ Hourí—a black-eyed nymph of the Mahommedan Paradise, of which, every true believer is to have no less than seventy-two.

In Akorá when\* this tale was told,  
 The people were dismay'd ;  
 And when night came, the hero's corse,  
 They from the field convey'd.

It seem'd the latter day was come,  
 So sore aggriev'd were they ;  
 And minstrels did their rebeks break,  
 Deep sorrow to display.

Next morning from Akorá then,  
 Set out a mournful train ;  
 And to Pesh'áwer bore the corpse,  
 Of him so basely slain.

The people of Pesh'áwer wept,  
 When they his fate did hear ;  
 And then they laid the body in,  
 The grave-yard of Panj Pír !†

Hakím ! lament for Abbás Khan,  
 That Khattak chief so bold ;  
 Oh where ! the like of him, oh where !  
 Shall we again behold.

\* Akorá— is a small town about ten miles west of the Indus or Attok : it is the chief town of the Khattak tribe.

† "The grave yard of Pánj Pír"—The Zí'arat-i-Pánj Pír, or the shrine of the five saints, is situated about a mile south-east of Pesh'áwer.

*Indian Oology—Notes on the Nidification of some of the commoner birds of the Salt Range, with a few additional from Kashmir, by W. THEOBALD, Junr. Esq.*

The present paper is the result of observations made during the years 1852-3, chiefly in the neighbourhood of Pind Dádan Khán and Katás, in the Salt Range, with a few scanty notes made during a flying trip of a month to Kashmir.

The only paper on the same subject I have seen is one by Capt. Tickell, with which in one or two instances my own notes will be found to differ. Layard and Kelaart have also given brief notices on the same subject from which one curious fact may be deduced, viz. that the same birds nest at various times in different parts of the country, a fact by no means surprising when the great extent and varied physical, seasonal and climatic features of our Indian empire are taken into consideration.

At present however, we must content ourselves with the careful exploration of particular districts without attempting to follow out the laws which doubtless regulate these seeming anomalies, which would require much more extensive information than we are at present possessed of.

It is not easy to explain why Oology has not found more favour with those whose taste or opportunities incline them to cultivate some of the minor branches of natural science, for without any undue bias it may at least be reckoned as entertaining and instructive, as many of those "ologies" which are usually considered pleasing, and withal, not unfashionable. Many however, who are ready enough conventionally to tolerate other similar pursuits, can, without being able to assign any particular reason, see in Oology little else than trifling and loss of time, but it requires very little examination to upset such an estimate, for there are few similar studies, if any, that surpass it in interest, few more varied, and none offering a less worked field of enquiry and speculation.

What varied and touching instances of craft and devotion does not the maternal *στροφή* prompt for the concealment and preservation of the callow brood either from natural enemies or from unforeseen perils, and where can we look for more pleasing instances of self-



denial than among birds engaged in tending their eggs or young. This has ever been a favourite and admired subject with poets and lovers of nature, who will not fail to accept in a far wider sense, than originally attached to them, the lines of Flaccus.

“ Non ferox  
Hector vel acer Deiphobus graves  
Excepit ictus pro pudicis  
Conjugibus puerisque primus.”

At no time too, are more conclusive proofs displayed by the brute creation of intellectual power, than by birds engaged in the duties of incubation. It appears indeed little less than absurd and a mere prejudice, to deny this faculty to the inferior animals, for if reason be defined in terms, their actions in a greater or less degree will be found to fulfil those terms with those of man himself, without doubt unmeasurably the highest in every respect of living forms, but between whom and the humbler inhabitants of the earth, that absolute gulph does not exist which his pride—his reasoning pride—has induced him to surmise.

The strong sense of Milton did not fail to see and acknowledge this, for Eve addressing the serpent, says :

“ What may this mean ? language of man pronounced  
By tongue of brute, and *human sense* expressed ?  
The first at least of these I thought denied  
To beasts, whom God on their creation-day  
Created mute to all articulate sound  
The latter I demur, for in their looks  
Much *reason*, and in their actions, oft appears.”

This passage shewing an acquaintance with and appreciation of the habits of animals, far from common at the time he wrote, affords a pleasing insight into the character of our great poet.

I shall now offer a few remarks as to the means I have found best, after some failures and losses, for preserving the fragile objects under consideration, in the hope they may prove of some service to other collectors.

There are three ways which may be adopted for emptying an egg according to its size and the amount of incubation it has received. All eggs when fresh or only slightly incubated may be blown after

a manner I shall now describe, but some care and careful handling are required to succeed with such eggs as of the English wren or Indian palmswift. The ordinary mode which the young idea usually aspires to inculcate into grandmamma is to make a hole at *both* ends, but the plan I adopt is preferable to the infantile custom, as from requiring a single hole, it does not so much damage or blemish the shell. On deciding on the proper spot which is best in the side, an oval hole must be made varying with the size of the egg, and on holding the hole downwards the contents are easily evacuated by blowing into the egg through a fine pointed blowpipe, the lip of which is just introduced within the shell.

The operation is neat and effectual but a violent blast must not be attempted, as in that case the yolk may cause a momentary obstruction and the egg explode from the pressure of the confined air within. Neither should the hole be made too large, as the air will then find too ready an exit and fail to expel the last portion of the contents. The empty shell should then be immersed in water and filled; by first exhausting the air with the blowpipe, this will effectually clean the interior, and the last remains of moisture may be absorbed on blotting paper. The interior should then be washed with a solution of corrosive sublimate in spirits. A common six penny brass blowpipe answers perfectly for this.

When however, the incubation has lasted a long time, a good plan is to extract the contents by means of a pin bent into a hook. This is a tedious operation which I merely mention in case of any rare egg requiring to be so treated. A third plan answers well for all eggs of a large or medium size, when well incubated. A moderately sized hole must be made in the eggs and the more liquid portion of the contents got rid of. They should then be wiped clean and placed in a shallow pan, when in a few days the maggots of the flesh-fly will consume the contents. They will then only require to be washed; an operation performed with the greatest comfort by one labouring under a severe cold, or glorying in an equally philosophic nose with the ingenuous doctor in "*Humphrey Clinker*." The best mode of packing moderate sized eggs in store is in wooden boxes with saw dust, after closing the holes in the shells with their paper. Tin boxes are not generally to be trusted, at least travelling,

as with such tender charges committed to their care a little smash goes a great way as I have ruefully learned from experience. Small eggs travel well packed in some soft nests as those of "*Lanius*" with a little wool and placed in wooden boxes. Small tin boxes fitted into trays in a wooden box are also very handy but are not readily got well made in this country.

For the nomenclature adopted in the present paper I am indebted to my friend Mr. Blyth, in several cases from the examination of skins of birds shot off the nest, and with a few exceptions, no reasonable doubt attaches to the correct identification of any bird in the present paper; those to which any uncertainty attaches are indicated by an asterisk.

The tabular form I have chosen as most convenient; the LOCAL NAME is ranged under the specific in the second column, the next contains the MONTH and WEEK in which the eggs are laid, the last column the colour of the eggs and a description of the nest.

In the penultimate column, three heads are contained. The number of eggs; usually ascertained from well incubated eggs, to guard against error. The form of the eggs expressed by letters; and the measurement of the long and short axes in inches and decimals of an inch. The following are the commoner forms in the abbreviations used:

O. Oval.	P. Pyriform.	R. Round.
B. O. Blunt oval.	O. P. Ovato Pyriform.	With some mi-
P. O. Pointed ditto.	B. O. P. Blunt ditto ditto.	nor combina-
L. O. Long ditto.	L. O. P. Long ditto ditto.	tions.
R. O. Round ditto.	R. O. P. Round ditto ditto.	

1	<i>Gyps Bengalensis</i> , .....	March 1st, 2nd, .....	1. O. P. ....	Dull white. Nest of sticks, and twigs in large trees.
	Gid Girij.		$\frac{8.36}{2.62}$	
2	<i>Neophron percnopterus</i> , ...	March 3rd, .....	2. L. O. ....	Pale brownish red, thickly blotched with dark brownish red. Nest, a few twigs placed in holes of cliffs and difficult to approach.
	Safed-doda.		$\frac{2.53}{1.90} \quad \frac{2.75}{1.84}$	
3	<i>Halicetus Gallicus</i> ? .....	March 2nd, 4th, April 2nd, .....	1. B. O. = L. B. O. ...	Pure white, with sometimes a few spots of brown. Nest of sticks in large tree.
	Burra ludi.		$\frac{2.78}{2.13} \quad \frac{2.67}{2.30} \quad \frac{3.18}{2.30}$	
4	<i>Circæetus gallicus</i> , .....	March 2nd, .....	1. O. ....	White with a few minute brown specks. Nest of twigs and sticks in large trees.
	Chota ludi.		$\frac{2.49}{1.90}$	
5	<i>Poliornis tees-a</i> , .....	April 2nd, .....	4. O. P. = B. O. P. ...	Pure grayish or plumbeous white. Nest small, of twigs, in trees, near cultivation.
	Trumti.		$\frac{1.80}{1.50} \quad \frac{1.93}{1.50}$	
6	<i>Buteo canescens</i> , Hodgson, ...	March 1st, 4th, .....	2-3. O. P. ....	Greenish white, or white, blotched with red or claret brown—vary greatly. Nest large in trees, sticks lined with cotton, rags, &c. and daubed with mud.
	Ilil.		$\frac{2.00}{1.66} \quad \frac{2.19}{1.66}$	

- 7 *Lanius lahtora*, ..... March 4th, April 4th, ... 5. O. P. ....  
     Lahtor (generic.)  
     1.06  
     0.80
- 8 *Lanius erythronotus*, ..... May 1st, 4th, ..... 5-6. B. O. P. ....  
     0.88 0.93  
     0.81 0.68
- 9 *Lanius Hardwickii*, ..... May 1st, 4th, June 2nd, 3-4 O. P. = B. O. P. ....  
     0.80 0.87 0.73  
     0.64 0.65 0.55
- 10 *Corvus-corax*, ..... January, February, ... 4. O. P. ....  
     Dom-kak Doda.  
     1.70  
     1.30
- Pale greenish white, blotched and ringed with yellowish gray and neutral markings—vary much in intensity and colour.  
 Nest of twigs, lined with cotton or wool, and usually placed in stiff thorny bushes.  
 White or pale greenish white slightly ringed and spotted with yellowish gray and neutral.  
 Nest of roots, coarse grass, rags, cotton, &c. lined with fine grass and placed in forks of trees.  
 Colour same as No. 8, also creamy or yellowish white, spotted with darker.  
 Nest compact, in forks of thorny trees; outside fibrous stalks, bound with silk or spider web and covered with lichens or cocoons imitating a weathered structure; inside lined with fine grass and vegetable down.  
 Dirty sap green, blotched with blackish brown; also pale green, spotted with greenish brown and neutral.  
 Nest of sticks, difficult to get at, placed in well selected trees or holes in cliffs.

11	<i>Corvus splendens</i> , ..... Kowa.	June 4th,.....	5. O. P. ....	Clear bluish green, spotted with blackish brown, size and colour variable.
			1.42 1.40 1.56 1.70	
			<u>1.05 0.95 1.18 0.97</u>	
				Nest, a neat but slight cup of twigs and roots, placed in medium sized trees.
12	<i>Columba intermedia</i> , ..... Kabuta.	March, April, May, June, July,.....	2. P. O. = B. O. ....	Pure white.
			1.63 1.43	Nest none, or only a few twigs in holes, in walls, buildings, cliffs, &c.
			<u>1.04 1.17</u>	
13	<i>Turtur risorius</i> , ..... Panduk.	April 3rd, May 1st, September 1st, .....	2. P. O. = B. O. ....	Pure white.
			1.21	Nest, a few twigs in low trees and bushes.
			<u>0.96</u>	
14	<i>Turtur Senegalensis</i> , ..... Ghughu (generic.)	March, April, May, June, Augt., Sept.,...	2. P. O. = B. O. ....	Pure white.
			1.11 1.20	Nest, a few twigs in low trees and bushes.
			<u>0.92 0.90</u>	
15	<i>Turtur humilis</i> , ..... Mor manjur.	April, May, June, Augt.,	2. P. O. = B. O. ....	Pure white.
			0.93 1.02	Nest, a few twigs in low bushes or trees.
			<u>0.74 0.76</u>	
16	<i>Pavo cristatus</i> , ..... Mor manjur.	June, July,.....	O. P. = B. O. P. ....	Clear brownish cream colour.
			2.66 2.50	Nest, a mere hole in the ground in difficult stony places in the hills.
			<u>1.88 2.00</u>	

17	<i>Perdix Ponteocriana</i> , .....	April 1st, May, Sept., ...	9. P. = O. P. ....	Clear cream colour. A little grass in a hole in the ground, usually sheltered by a bush : or in clumps of grass.
	<i>Jita</i> .		$\frac{1.29}{1.03}$	
18	<i>Amnoperdix Bonhami</i> , .....	April, May, Juno, .....	12. P. = O. P. ....	Clear cream colour. A slight hollow among stones in the hills.
	<i>Susi</i> .		$\frac{1.40}{1.00}$	
19	<i>Caccabis chakor</i> , .....	April, May, .....	12. O. P. = B. O. P. ....	Yellowish white or brownish cream colour, faintly ringed and spotted with tan colour. A few leaves on ground under bushes.
	<i>Chakor</i> .			
20	<i>Turnix Sykesii</i> ? .....	August 3rd, .....	5. R. P. ....	Pale gray closely freckled with dirty yellowish ochre, with a few dots of neutral, and blotched with deep reddish brown or blackish umber. Nest, a little grass hemp yarn, and a few hairs on ground in field of Bajra.
	<i>Bailer (Taigoor.)</i>			
21	<i>Palæornis torquatus</i> , .....	May 3rd, .....	4. R. O. P. ....	Pure white. Nest none, eggs laid in holes, in walls, trees and steep banks in company with No. 12.
	<i>Totha (generic.)</i>		$\frac{1.25}{1.05}$	Pure white.
22	<i>Palæornis carulocephala</i> , ....	March 3rd, .....	4.5 B. P. ....	Eggs laid in holes in trees.
			$\frac{1.13}{0.95}$	$\frac{1.17}{0.93}$

23	<i>Pycnonotus leucotis</i> , ..... May, June, July, .....	4. O. P. ....	White, much dotted with claret red. Nest, a neat cup of vegetable fibres in bushes.
	Bulbul (generic.)	0.91 <hr/> 0.64	
24	<i>Pycnonotus Bengalensis</i> , .... May, June, July, .....	4. B. O. P. ....	Deep pink, blotched with deep claret red.
		0.87 <hr/> 0.62	Nest similar to No. 23.
25	<i>Acridotheres tristis</i> , ..... June, .....	5. O. P. ....	Pale bluish green.
	Maina.	1.20 <hr/> 0.85	Nest roots and other rubbish, in trees or holes in house, Varan- das, &c.
26	<i>Acridotheres gingianus</i> , ..... May 3rd, .....	7.8 O. P. ....	Clear greenish blue.
	Gang-maina.	1.08 <hr/> 0.81	Nest, a hole in the sand at the end of a gallery run into a steep bank, many nests in company.
27	<i>Cypselus affinis</i> , ..... April, May, June, Augt., Sept., .....	O. P. ....	Pure white.
	Ababil (generic.)	0.90 <hr/> 0.56	Nest, light straw and feathers strongly agglutinated to rafters of houses, nests in colonies and often united together, size varies much, some have long necks others are mere saucers without any. Second nests are less care- fully built. The inside is not lined, and feels like coarse card- board.



28	<i>Hirundo Sinensis</i> , .....	February 3rd, .....	4. O. P. ....	Pure white. Nest of grass lined with feathers, placed at the end of a gallery in a steep river bank.
			0.62 <hr/> 0.48	
29	<i>Oriolus kundoo</i> , .....	May 2nd, .....	4. O. P. ....	Pure white with a few black spots. Nest a neat cup of woven grass, attached by the side to a bough of some fruit tree.
			1.17 1.23 <hr/> 0.81 0.75	
30	<i>Dicrurus macrocerus</i> , .....	May, June, .....	4. O. P. ....	Dirty reddish white spotted with red; colours vary; in some the spots seem to have run, as ink does on damp paper.
	<i>Jápal kalchit</i> .		1.08 <hr/> 0.73	Nest a neat shallow cup of roots and stalks in bushes.
31	<i>Passer domesticus</i> , .....	February, March, April, May, June, July, ...	5-6. O. P. ....	White spotted and blotched with brownish black or brownish white blotched with deep brown; colour varies much.
	<i>Gureia</i> .		0.85 0.82 <hr/> 0.65 0.61	Nest a loose structure of grass and feathers, in trees or houses.
32	<i>Malacocercus caudatus</i> , .....	March, April, May, June, August, .....	4.5 O. P. L. O. P. ....	Clear greenish blue. Nest a loose but deep cup of grass and twigs in bushes in jungle or garden. The first size is com- mon, the second and third mea- surements were from eggs of one nest.
	<i>Sór</i> .		0.84 1.04 0.75 <hr/> 0.66 0.60 0.55	

- 33 *Oxylophus melanoleucus*, ...August, ..... 1. B. O. .... Deep greenish blue.  
 (Identified by Mr. Blyth.)  $\frac{0.91}{0.81}$  This evidently parasitical egg was taken from the nest of No. 32, containing four ordinary eggs which it closely resembles in colour, though its form indicates its parasitical character.
- 34 *Galerita cristata*, ..... March 4th, May 3rd, ... 4. O. P. .... Yellowish white uniformly freckled, with grayish yellow and neutral.  
 Chandul.  $\frac{0.88}{0.66}$   $\frac{0.82}{0.64}$  Nest, a little grass in a hole in the ground.
- 35 *Thamnolia Cambaicusis*, ...April 2nd, ..... 4. P. O. P. .... Greenish white ringed and spotted with pale reddish and a little neutral.  
 Jimma (generic.)  $\frac{0.79}{0.60}$  Nest, loose grass and bits of snake's skin in holes in the sides of Nullas.
- 36 *Nectarina asiatica*, ..... May 4th, ..... O. P. .... Grayish white freckled and ringed with cineritious gray.  
 Nest, a neat purse of vegetable fibre and down suspended from some small bough and masked in front by a few dead leaves loosely attached by silk threads.

37 *Munia Malabarica*, ..... May, August, Septem-12. 13. = (25.) ..... Pure white.  
 ber, October, Decem-O. P. 0.59  
 ber, ..... 0.46

0.64 0.60  
 0.44 0.50

and hastily made—but usually a neat domed structure of fine grass with one opening, sometimes prolonged into a short deflected neck partially closed by the elasticity of the long spikes of grass forming it; sometimes the nest is a simple platform of grass, open at each end, but the grass ends curved over to meet at the top, usually placed in thorny bushes, often very conspicuously and close to roads. It is much to be doubted if the eggs found occasionally in October and December, are hatched.

1 *Podiceps Philippensis*, ..... August, September, ... 5. P. O. L. P. O. .... Pure white; when recently laid, green is soon soiled brown in the nest.  
 Pandubi. 1.50 1.42  
 1.04 1.00

Nest, a few weeds heaped on the rank vegetation of jheels, but floating, and usually several nests together.

2 *Gallinula chloropus*, ..... August 4th, ..... O. P. .... Pinkish cream or gray spotted and slightly ringed with deep red [nest. brown.]  
 1.62  
 1.15

3 *Sarcophorus lilobus*, ..... May 2nd, ..... 3. P. = O. P. .... Nest as No. 1: eggs also stained by creamy yellow or stone colour, thickly spotted and blotched with blackish brown.  
 1.63  
 1.19

Jithiri.

4 <i>Ardeola leucoptera</i> , .....June 4th, .....	5. 6. P. O. ....	Pale green.
Bogla (generic).	1.54	Nest of loose sticks in trees.
	<u>1.16</u>	

*Kashmir Notes.*

1 <i>Tinunculus alaudanus</i> , .....April 3rd, .....	6. B. O. P. ....	Pale reddish brown freckled and blotched with brownish red.
Shikra.	1.68 1.51	Nest, hole in sarai wall of Thanna S. of Baramgala Shalabad and valley generally.
	<u>1.22 1.27</u>	
2 <i>Milvus ? Buteo</i> , .....April 4th, .....	2. O. P. ....	Nest and eggs as in plains. (No. 6 ante.)
	2.10 2.40	
	<u>1.80 1.77</u>	
3 <i>Corvus</i> , .....April 3rd, .....	4. O. P. ....	Green, spotted with brown, valley generally.
Small black Hill Crow.	1.70 1.60	Nest placed in "chinar" and difficult trees.
	<u>1.20 1.25</u>	
4 <i>Corvus monedula</i> , .....May 1st, .....	4. 5. 6. O. P. L. O. P. ....	Pale clear bluish green: dotted and spotted with brownish black.
	1.26 1.45 1.60	Valley generally. In holes of rocks, beneath roofs, and in tall trees.
	<u>0.99 1.00 1.00</u>	
5 <i>Sturnus vulgaris</i> , .....May 2nd, 3rd, .....	O. P. ....	Pale clear bluish green.
Jilgiri.	1.15	Valley generally; in holes of bridges, tall trees, &c. in company with No. 4.
	<u>0.85</u>	

6	<i>Acridotheres tristis</i> , .....	April 3rd, .....	Nest and eggs as in plains. Rajauri and lower hills generally.
7	<i>Cacabais chukor</i> , .....	May 3rd, .....	Nasmána on the Chandra-béga: eggs as ante, No. 19.
8	<i>Pycnonotus leucotis</i> , .....	April 4th, at Bhimba, May 2nd at Islamabad.	Nest and eggs as in plains; ante No. 23.
9	<i>Hirundo rustica</i> ,* .....	May 2nd, .....	Pure white spotted with bright reddish brown. Valley generally.
			Nest under caves, outside coarse straw cemented with mud, inside fine straw lined with feathers.
10	<i>Budytio citreola</i> , .....	May 3rd, .....	Palo gray thickly dotted and ringed with grayish brown and grayish neutral mingled together.
			A depression in soft earth beneath a rock near Baragari. Valley generally.
1	<i>Anas Boschas</i> , .....	May 1st, .....	Dirty white with a tinge of yellowish green near Supeia valley of Cashmir.
2	* <i>Podiceps cristatus</i> ? .....	May 2nd, .....	Pure white; when recently laid pale green. Wala lake.
			Nest, a heap of weeds floating on the surface of the water, but connected to reeds, &c.

3 Podiceps Philippensis, .....May 2nd,	.....	5. P. O. ....	Puro white. Wala lake. Nest as No. 2.
		1.40	
		<u>1.00</u>	
4 Fulica atra,.....May 2nd,	.....	8. L. O. P. ....	Pale brownish gray, dotted with reddish black. Wala lake.
		2.10	Nest, pieces of dried reeds about 6 inches long, piled together among reeds and floating on the water.
		<u>1.40</u>	
5 Gallinula chloropus, .....May 2nd,	.....	O. P. ....	Pale gray or reddish gray dotted and spotted with deep reddish brown.
		1.70 1.57	Nest, a few weeds heaped on the water among reeds.
		<u>1.26 1.11</u>	

*On the Peculiarities of the Gáthá Dialect.*—By BĪBU RĀJEN-  
DRALÁL MITTRA.

It is an established truth in the science of Philology that languages change in course of time, even when uninfluenced by the intrusion of foreign elements. This process of mutation is most clearly exemplified in the transition of the Latin into the modern dialects of Italy, which have assumed their present forms by a series of phonetic changes from the influence of the *genius loci* without any such heterogeneous admixture as are met with in the languages of England and France. In India, the Sanskrita has undergone the same course of transformation, and like the Latin has produced a number of Prakrita or vernacular dialects by a process of curtailment of inflexion and euphony to which the Romance and Germanic languages of Europe offer the nearest parallel.

Of the dialects which have proceeded from the Sanskrita, the Páli and the Mágadhi have hitherto been supposed to bear the closest resemblance to their parent, but the discovery of the Sanskrita Buddhist literature of Nepal (thanks to the untiring zeal of the learned Mr. Hodgson) has brought to our knowledge a new dialect bearing a still closer affinity to the classic language of the East, than either of the former. Nepalese chroniclers have named it Gáthá, (ballad) probably, from its having been principally used by the scalds and bards of mediæval India. For nearly a similar reason the Balenese style the language of their poets, the *Kúvi* or poetical, and the language of the Vedas is called *Ohhandas* (metrical), whence by a well-known euphonic law, we have the *Zend* of the old Persians.

M. Burnouf, the only European scholar who has noticed the existence of this dialect, describes it to be "a barbarous Sanskrita in which the forms of all ages, Sanskrita, Páli and Prákrita appear to be confounded."\* It differs from the Sanskrita more in its neglect of the grammatical rules of the latter than from any inherent peculiarity of its own. The niceties of the Sanskrita forms of declension and conjugation find but a very in-

\* *l'Histoire du Bouddhisme*, p. 104.

different attention from the Gáthá versifier; he uses or rejects the usual case-affixes according to the exigencies of his metre with as much veneration for the rules of Pánini as the West Indian Negro has for those of Lindley Murray; indeed, the best illustration that can be given of the relation which exists between the Sanskrita, the Gáthá and the Páli, would be extracts from the literature of the Negroes. The following paragraph from a Negro version of the New Testament by some Moravian Missionaries\* bears exactly the same relation to the English of the *Times* newspaper as the Páli does to the Sanskrita of the Purāṇas, and the affinity of its translation to the same standard, may be very appropriately likened to that of the Gáthá to the bráhmaṇic language of the gods.

“Drie deh na bakka, dem holi wan bruiłoft na Cana na Galilee, en mamma va Jesus been ce dapeh. 2, Ma dem ben kali Jesus nanga him disciple toe va kom na da bruiłoft. 3, En tah evieni kaba, mamma va Jesus takki na him, dem no habi wieni morro. 4, Jesus takki na him nu mamma noe worko me habi nanga joe. Tem va mi noben kom jette.”

*Translation.*—“Three days after back, them hold one marriage in Cana of Galilee, and mamma of Jesus been there. 2. But them been call Jesus with him disciples to come to that marriage. 3. And when wine end, mamma of Jesus talk to him: Them no have wine more. 4. Jesus talk to him me mamma how work me have with you, time of me no come yet.”

The Gáthá exists only in a versified form, and is to be met with in that class of Buddhist writings called the *Mahávaipulya* or the “highly developed” sutras. It occurs generally at the end and often in the middle, but never at the commencement, of a chapter, and contains a poetical abstract of the subject described in the prose portion of the works. The latter is written in pure Sanskrita, and comprises a highly amplified version of the subject matter, and often adverts to circumstances unnoticed in the former. In its extreme verbosity, the prose bears a strong resemblance to the Tantras, a class of works which was introduced into India between the 4th and the 7th centuries of the Christian era, and appears to be the production of men who undertook to write voluminous works with insufficient materials.

\* Apud Quarterly Review, No 76.



The Gáthá is written in a variety of metres from the facile octosyllabic *anushtup*, to the most complicated *Sárdulavikrīḍita*, which includes 19 syllables to the foot, and is remarkable for the simplicity of its style, and the easy natural flow of its language. Its peculiarities are those of a language in a state of transition; it professes to be Sanskrit, and yet does not conform to its rules. In it we find the old forms of the Sanskrita grammar gradually losing their expressive power, and prepositions and periphrastic expressions supplying their places, and time-hallowed verbs and conjugations juxtaposed to vulgar slangs and uncouth provincialisms. At one place, orthography is sacrificed for the sake of prosody and a word of a single short syllable is inflated into one of three syllables, while at another the latter yields to the former and a molossus supplies the place of a pyrrhic or a tribrach. A spirit of economy pervades the whole, and syllables and words are retrenched and modified with an unsparing hand. In the *Lalita Vistara*, a work of the highly developed class, instances of these peculiarities occur in great profusion, and they may be generally referred to (A) exigencies of metre, (B) provincialisms, and (C) errors of syntax and prosody.

A. Of the changes which may be attributed to the exigencies of metre, prolongation, contraction and elision of vowels, elision of consonants, and the segregation of compound consonants and long vowels into their simple elements, appear to be the most frequent. We shall quote a few instances :

1st. Of the prolongation of vowels the following may be taken as examples. They are not so frequently met with, as contractions.

ना च for न च p. 260.\*

सा च for स च p. 292.

प्रयाति for प्रायातः p. 288.

रोदमान for रुदमान p. 288.

ने for नाः p. 293.

2nd. Of contractions of vowels, instances occur almost in every *śloka*. They are generally effected by the use of short for long vowels, and the substitution of *i* and *u* for *é*, *ai*, *o* and *au*. For example :

\* These instances are quoted from the edition of the *Lalita Vistara* now in course of publication in the *Bibliotheca Indica*.

यानि for याने p. 291.

धरेन्ति for धारयन्ति p. 89.

द्रुमवर for द्रुमवराः p. 89.

माय for माया p. 91.

वण्ड for वण्डा p. 92.

पुञ्जमेतां for पूजामेतां p. 93.

यद्य for यद्या

तद्य for तद्या

सद् for सदा

3rd. Elisions of vowels and consonants are also very frequent ; they are effected principally with a view to economy and euphony. Final *ses* are invariably elided. Take for instance :

नमे for नमसि

अप्सरः for अप्सरसः p. 293.

सदार्षिक्लृप्ति for सदार्षिणि क्लृप्ते p. 201.

इम इष्ट वर्यां for इमां इष्टा अवस्थां p. 229.

निश्चरो for निश्चार p. 220.

प्रदिधिति for प्रदिधायति p. 93.

मना for मनसः

एन for एतेन p. 293.

4th. Of the division of long vowels and compound consonants into their short and simple elements, the following are instances of constant occurrence :

रानिये for रान्याः or रान्याम् p. 291.

तुरियेभि for तुर्येभ्यः p. 220.

गिज्ञानो for ज्ञानो p. 228.

इक्षि for क्षी p. 291.

तुरिय for तूर्य p. 288.

अक्षिज्ञानका for अज्ञानक p. 460.

This tendency to segregation of aspirated consonants, forms a principal characteristic of mediæval and modern Indian phonology. The Pāli and the Prākṛita owe their origin entirely to this cause. The Hindi and the Marhatti indulge in it to a large extent, and the Bengālī is not exempt from its influence. The process, however, of effecting this change is not uniform. In languages with a strong vocalic tendency, the sharpness of compound consonants is filed off by the elision of the first letter and the reduplication of the

second. Thus *abja* (lotus) is converted to *ajja*; *karma* (work) to *kam-ma*. In compounds of a liquid and an aspirated letter, the former is invariably elided without reference to its position, and accordingly "*padma*" [lotus] is changed to *padḍa*, "*sadma*" [house] into *sadda*, and *haridrā* [turmeric] into *haliddā*. The Italian, which is by far the most vocalic of all European languages, has this tendency in a prominent degree. In it, the Latin *subjunctivus* passes into *saggiuntivo*, *perfectio* into *perpetto*, *absorbeo* into *assorbire*, &c. &c. In languages which abound in consonantal finals, compound consonants are segregated by the interposition of a vowel between them, the final vowel being occasionally elided; thus in the Hindi, the Sanskrita word "*marma*" [a joint] is, by the interposition of an *a* after the *r* and the elision of the final *a*, converted into *maram*; *dharam*, *karam* and *parab* are instances of the effect of the same rules. These rules, however, are not universal in their application, and exceptions are very frequent.

B. The provincialisms of the Gáthá include (α) neglect of gender, number and case, (β) abbreviations and omissions of declensions, (γ) corruption of pronouns, and (δ) new forms of conjugation.

α—Of the neglect of gender, number and case, the following may be taken as examples:

विष्णुनिर्मलं for विष्णुनिर्मलान् p. 292 (singular for plural).

बुद्धसेवं for बुद्धसेवाणि p. 292 (ditto).

तानपि for तावपि p. 291 (plural for dual).

आसनिना for आसनात् p. 177 (instrumental for ablative).

बोधिमुवढ for बोधिमुवढात् p. 462 (objective for ablative).

जई वल्ला for जई वल्लौ p. 324 (plural for dual).

केचिदेकपादे for केचिदेकपादेन p. 324 (locative for instrumental).

बिलोकं for बिलोकी p. 316 (neuter for feminine).

कारणां for कारणानि p. 325 (singular feminine for plural neuter).

मचवाः for मचवाणि p. 236 (masculine for neuter).

मुक्कहारं for मुक्काहारः p. 237 (dative for nominative).

मचकं for मचकः p. 237 (ditto).

β—Under the head of abbreviations and omissions of declension, the most remarkable peculiarity appears to be the use of *ञ* in the room of all flexional affixes. This helps in a great measure to give sweetness and variety to the style, but at the same time it contributes to render the meaning dubious, and the study of the Gáthá

a matter of great difficulty to those who have nothing but their knowledge of the Sanskrita grammar to help them. In the Páli and the Prákrita, the use of this occasional substitute is confined to the first person of the nominative singular. In the Braja Bhákhá, however, it has a much wider range. In the following verse, it is used both for the nominative and the dative, as well as an euphonic adjunct to verbs in the second person of the indicative :

मो ते कक्षा मसकरी करऊ ।

कुवचन बोले तुमहि मरऊ ।

घोषाके मन उपजे रोसु ।

भलो कहत कत लावे दोसु । (De Tassy's Chrestomathie Hindie, p. 79.)

The use of the *u* in the Gáthá, is made with much reserve and the regular inflections of the Sanskrit prevail. The locative *i* (इ) is not subject, as in the Sanskrita, to any change of form by association with a vowel. In the vocative a long *á* (आ) is the most approved case-affix. In some cases, however, inflections are altogether dropped.

γ—The following are the corruptions of pronouns that are frequently met with in the Lalita Vistara. They apparently lead the way to the formation of pronouns in the modern vernaculars.

मद्य for मम and मत्तः

तुभ्य for त्वय, त्वां, and तव

अय for एवः

ते for ता

कहिं for कुच and केन

δ—The new forms of conjugation observable in the Gáthá are attributable exclusively to corrupt pronunciation; they follow no fixed rule, and are the result of that natural tendency to abbreviation which in English originates “wont” from “will not” and “shant” from “shall not.” The following are a few examples :

याति for गच्छति

ददमि for ददामि

विवरो for व्यदशेत्

निष्क्रममि for निष्क्रामति

भोसि for भवसि

भोति for भवति

भोमि for भवमि

मुचि for अमुचन्

बजनेहि for बाजनेय  
 रमिचसि for रंस्सने  
 चारहि for चरोहत्  
 चरसो or रसो for चरत्  
 उत्ति for उत्तिष्ठ  
 महुवन्तो for श्रुत्ति  
 दद for ददत्  
 श्रुषेहि for श्रुत्  
 प्रहेमि for पश्मामि  
 मुहसो for चमुह  
 भेयि for भविष्यामि-व-म-ति-तः चन्नि-सि यः-य  
 परिकय for परिकयय  
 न्यसी for निदधुः  
 श्रुत्ति for मुत्ता  
 चोरहिता for चवत्त  
 श्रुपयिद्यु for श्रुपयामाद्युः  
 अहिता for हिता  
 बुद्धि for बुद्धा

It may be remarked that the corruptions above quoted are, in many instances, the precursors of forms adopted in other affiliated dialects. In Sanskrita the third person singular of the verb *to be* is *Bhavati*, which in the Gáthá changes to *Bhoti* by the conversion of the *v* into *o* and the elision of the *a* before and after it, (*Bhonti* in the plural and *Bhosi* in the second person singular) and thence we have *hoti*, *hosi* and *honti* in the Mágadhi; *Hae* and *Haen* in the Khariboli, and *dhe*, *ahet* and *ahes* in the Marhatti. In the Hindi, notwithstanding the reduplication of the root in *hotáhae*, the original form is still distinctly indicated. *Sunitvá* for *s'rutvá* is the first step to the formation of *s'unia* in Bengali, while *s'unohi* passes into *s'uno* with nothing but the elision of an inflexion, which in the original Sanskrita, is oftener omitted than retained.

C. In the collocation of words and phrases the Gáthá strictly follows the rules of Sanskrita Syntax, but in the formation of compound terms it admits of many licenses highly offensive to the canons of Pálini and Vopa deva. They seem, however, to be the consequence of haste and inattention, and are not referible to any dialectic peculiarity. The same may be said of the errors of Prosody which, notwithstanding the anxiety of the Gáthá versifier

to avoid false metre even at the expense of etymology, prevail to a great extent in their compositions. In this respect the Gáthá may be likened to the Kabits of the Bháts of modern India, who in their attempt to combine freedom of elocution, harmony and grammar in their improvisations—sadly offends against all three.

Of the origin of the Gáthá, nothing appears to be known for certain. M. Burnouf is inclined to attribute it to ignorance; he says:—

“This fact (the difference of language of the different parts of the Vaipulya S’utras) indicates in the clearest manner that there was another digest (of the Buddhist literature prepared, besides those of the three convocations) and it agrees with the development of the poetical pieces in which these impurities occur, in shewing that those pieces do not proceed from the same hand to which the simple Sutras owe their origin. There is nothing in the books characterised by this difference of language, which throws the smallest light on its origin. Are we to look on this as the use of a popular style which may have developed itself subsequent to the preaching of Sákya, and which would thus be intermediate between the regular Sanskrita and the Páli,—a dialect entirely derived and manifestly posterior to the Sanskrita? or should we rather regard it as the crude composition of writers to whom the Sanskrita was no longer familiar, and who endeavoured to write in the learned language, they ill understood, with the freedom which is imparted by the habitual use of a popular but imperfectly determined dialect? It will be for history to decide which of these two solutions is correct; to my mind the second appears to be the more probable one, but direct evidence being wanting, we are reduced to the inductions furnished by the very few facts as yet known. Now, these facts are not all to be found in the Nepalese collection; it is indispensably necessary in order to understand the question in all its bearings to consult for an instant the Singalese collection and the traditions of the Buddhists of the South. What we thence learn is, that the sacred texts are there written in Páli; that is to say in a dialect derived immediately from the learned idiom of the Bráhmans, and which differs very little from the dialect which is found on the most ancient Buddhist monuments in India. Is it in this dialect that the poetical portions of the great Sutras are composed? By no means; the style of these portions is an indescribable

melange in which incorrect Sanskrit bristles with forms of which some are entirely Páli and others popular in the most general sense of the term. There is no geographical name to bestow upon a language of this kind; but it is at the same time intelligible how such a jargon may have been produced in places where the Sanskrita was not studied systematically, and in the midst of populations which had never spoken it or had known only the dialects derived from branches more or less remote from the primitive stock. I incline then to the belief that this part of the great Sutrás must have been written out of India, or, to express myself more precisely, in countries situated on this (western) side of the Indus, or in Cashmir, for example; countries where the learned language of Bráhmaism and Buddhism would be cultivated with less success than in Central India. It appears to me almost impossible that the jargon of these poems, could have been produced in an epoch when Buddhism flourished in Hindustán. There, in fact, the priests had no other choice but between these two idioms; either the Sanskrita, i. e. the language which prevails in the compositions collected in Nepal, or the Páli, that is the dialect which is found on the ancient Buddhist inscriptions of India, and which has been adopted by the Buddhists of Ceylon.”\*

This opinion, we venture to think, is founded on a mistaken estimate of Sanskrita style. The poetry of the Gáthá has much artistic elegance which at once indicates that it is not the composition of men, who were ignorant of the first principles of grammar. Its authors display a great deal of learning, and discuss the subtlest questions of logic and metaphysics with much tact and ability, and it is difficult to conceive that men who were perfectly familiar with the most intricate forms of Sanskrita logic; who have expressed the most abstruse metaphysical ideas in precise and often in beautiful language; who composed with ease and elegance in *Arya*, *Totaka* and other difficult measures, were unacquainted with the rudiments of the language in which they wrote, and even unable to conjugate the verb to be, in all its forms. This difficulty is greatly enhanced, when we bear in mind that the prose portion of the Vaipulya Sutrás is written in perfectly pure Sanskrita, and has no trace whatever of the provincialisms and popular forms so abundant in the poetry. If these

\* *l'Histoire du Bouddhisme Indien*, p. 105.

Sutras be the productions of men beyond the Indus imperfectly acquainted with the Sanskrita, how happens one portion of them to be so perfect in every respect, while the other is so impure? What could have been the object of writing the same subject twice over in the same work, once in pure prose and then in incorrect poetry?

It might be supposed—what is most likely the case—that the prose and the poetry are the productions of two different ages; but the question would then arise, how came they to be associated together? What could have induced the authors of the prose portions to insert in their works, the incorrect productions of Trans-Indus origin? Nothing but a sense of the truthfulness and authenticity of those narratives, could have led to their adoption. But how is it likely to be supposed that the most authentic account of S'ákya within three hundred years after his death, was to be had only in countries hundreds of miles away from the place of his birth, and the field of his preachings? The great Sutras are supposed to have been compiled about the time of the third convocation, (309 B. C.) when it is not at all likely that the sages of Central India would have gone to Cashmere in search of data, which could be best gathered at their own threshold.

The more reasonable conjecture appears to be that the Gáthá is the production of bards, who were contemporaries or immediate successors of S'ákya, who recounted to the devout congregations of the prophet of Magadha, the sayings and doings of their great teacher, in popular and easy flowing verses, which in course of time came to be regarded as the most authentic source of all information connected with the founder of Buddhism. The high estimation in which the ballads and improvisations of bards are held in India and particularly in the Buddhist writings, favours this supposition; and the circumstance that the poetical portions are generally introduced in corroboration of the narrative of the prose, with the words : तत्रेदमुच्यते, "Thereof this may be said," affords a strong presumptive evidence.

According to the *Mahawanso*, the Buddhist scriptures were chaunted chapter after chapter as they were compiled by the Theros of the first convocation. This could scarcely have been possible had not the Sutras been in verse, and that they were in verse and in



the Gáthá form too, we learn in another part of the same work (Chap. 37th).\*

The Hon'ble Mr. Turnour is of opinion that the religion of S'ákya was originally "preached and spread among the people" in the Páli language, and yet in his edition of the Maháwanso he has shewn that Mahindo son of Asoka translated the Buddhist scriptures into Cingalese from the digest prepared at the convocation held in the 27th year of his father's reign, and that from that recension the Páli version was got up in the middle of the fifth century (459 @ 477 A. C.) admitting thereby that the language used at the third convocation was other than Páli, for if Asoka's edition had been in that language a new edition from the Cingalese recension would have been quite uncalled for, if not useless. As a collateral evidence it may be noticed that the history of S'ákya as recorded in the Burmese "*Malalengara Wattoo*"† which is a faithful translation of the Pali *Lalita Vistará*, bears a closer approximation to the narrative of the Gáthá than to that of the prose of the great Sutras, shewing the former to be a more authentic, at least a more generally received, version than the latter.

The language of the Gáthá is believed, by M. Burnouf, to be intermediate between the Páli and the pure Sanskrita. Now, as the Páli was the vernacular language of India from Cuttack to Kapur-dagiri within three hundred years after the death of S'ákya, it would not be unreasonable to suppose that the Gáthá which preceded it was the dialect of the million at the time of S'ákya's advent. If our conjecture in this respect be right it would follow that the Sanskrita passed into the Gáthá six hundred years before the Christian era; that three hundred years subsequently it changed into the Páli and that thence in two hundred years more, preceded the Prákrita and its sister dialects the Sauraseni, the Drávidi and the Pañcháli, which in their turn formed the present vernacular dialects of India.

\* When Buddhohoso offered to undertake the translation of the Cingalese version of the Pitakattayan into Páli, the priesthood of the Maháviharo at Anurá-dhápuro "for the purpose of testing his qualifications, gave him only two GA'THA's, saying; hence prove thy qualification; having satisfied ourselves on this point, we will then let thee have all the books." Ante Vol. VI. p. 508.

† For a translation of this work vide *Journal American Oriental Society*, Vol. III. p. 1 et seq.

PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,

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FOR SEPTEMBER, 1854.

At an ordinary general meeting of the Society held on the 6th instant, at half-past 8 P. M.

The Hon'ble Sir J. W. COLVILLE, Kt. President, in the chair.

The proceedings of the last month were read and confirmed, and the accounts and vouchers for the months of June and July laid on the table.

Presentations were received—

1. From the Government of Bengal through Mr. Under-Secretary Young, for the use of the Museum of Economic Geology, Maps of South Behar, Hooghly and Bhaugulpore.

2. From Capt. Thuillier, maps of the same districts for the use of the Library of the Society.

3. From J. P. Collier, Esq., two copies of a work on the Languages of the Seat of War, by Dr. Max Müller.

4. From Mr. W. Theobald, seventeen Indo-Scythian copper coins.

5. From R. M. Stephenson, Esq. through Lieut.-Col. Baker, Specimens of Iron Ore from Midnapore and of Sulphate of Iron from Assam. Of the latter Mr. Wagentriever writes: "The quantity now sent cannot be taken as a criterion of what it would actually cost if collected in larger quantities, and regularly, but the expense attending the six maunds and twenty-three seers was Rs. 17, *on board* the Flat or at the rate of Rs. 2-9-4; it could however be delivered on the banks of the Berhampooter at a much lower rate than that."

6. From the Society of Antiquaries, through J. Akermann, Esq. Secretary, Archæologia Vol. XXXV. p. 2, and Proceedings Nos. 37—40.

R. Spankie, Esq., C. S. duly proposed and seconded at the last meeting, was balloted for and elected an ordinary member.

W. Muir, Esq. C. S. was named for ballot at the next meeting ; proposed by the Hon'ble J. R. Colvin and seconded by the President.

Communications were received—

1. From Dr. E. Balfour, in charge of the Government Central Museum at Madras, forwarding a memorandum regarding the forests and woods of Southern India, prepared with a view to procuring information from the various districts, for a report to be made to the Madras Government on the 31st December, 1854.

2. From the Assistant Secretary to the Government, N. W. Provinces, enclosing copy of a Meteorological Register kept at the Secretariat office at Agra for the month of July last.

3. From Bábu Rádhánáth Sikdár, enclosing an Abstract of the results of the hourly Meteorological Observations taken at the Surveyor General's Office, in the month of May, 1854.

4. From Capt. E. T. Dalton, submitting a paper entitled "Notes on Assam Temple Ruins."

5. From the same, enclosing facsimiles and engravings of silver coins found at Gowhatty. The coins are of Shumsoodeen, Ilyas, Sekunder Shah, Gyasoodeen, Azim Shah and Mohamed Shah of the early Patan Dynasty. "They were found" says Capt. D. "full fifteen feet below the surface. The fortunate discoverer picked up a great many more than he made over to me, but it is rather curious that there should be such a variety in so small a collection."

6. From Prof. F. E. Hall, Benares, a paper entitled "a Passage in the life of Válmiki."

7. From W. Muir, Esq., Secretary to the N. W. Government, announcing that the Lieut.-Governor had sanctioned an expenditure of Rs. 500 for prosecuting the excavations of Sárnáth.

The Librarian and the Curator of the Zoological department submitted their usual monthly reports.

After the close of the regular business of the evening, Mr. Oldham briefly described the geological structure of the Sub-Himalayan hills, south of Darjiling; of the Khasia hills; and of the Rajmahal hills.

South of Darjiling, forming the lower portion of the great range of the outer Himalayah, occurs a group of sandstones, hard greenish coloured clunchy clays, and a few beds of shales, or laminated clays, forming together one continuous formation, attaining a stratigraphical thickness of upwards of 4000 feet. These all dip at high angles ( $40^{\circ}$  to  $70^{\circ}$ ) towards the north and north by west; or towards the hills. Their actual junction with the great mass of the gneissose, micaceous and quartzose metamorphic rock of which the higher masses of the hills are composed, was not traced in the neighbourhood of the Teesta; but their connection can be seen more to the west, where these sandstones are brought into contact with the metamorphic rocks by a great fault which bears nearly east and west.

In these sandstones, occur many imbedded stems of trees often of large size, frequently much worn and deprived of their bark and branches, but occasionally with the bark perfectly preserved and mineralized into a brilliant jet; the mass or central part of the stem being replaced by siliceous matter. In the bed of shales associated with the sandstones, occur numerous leaves of dicotyledonous trees, in all cases detached, and often much worm-eaten and decayed, but in general aspect of a very recent or modern character. Near the river Teesta, I did not find myself any remains of animals, nor did I hear on enquiry from the natives that such had ever been found. Dr. J. Hooker in his most interesting Journals mentions that he found in the continuation of these same rocks, a little further to the westward, what he thought was the shaft of a bone, and also some very imperfect vegetable remains, which he referred to *Vertebraria*. The correctness of the latter reference, I am inclined to doubt. After a careful search, I could myself find nothing of the kind, although numerous vegetable remains were met with; and I am tolerably certain that no trace of this remarkable genus *Vertebraria* is to be met with there.

These rocks extend into Bhotan on the east, and stretch away to the west also, but their limits in either direction are unknown. So far as they have been traced, they maintain the same general direction and dip.

The whole thickness of these rocks (more than 400 feet) consists of perfectly conformable beds, following in regular sequence, and containing identically similar plants in the uppermost as well as in the lowest beds of the group. They constitute therefore one great formation, the upper inferior limits of which are in this district unseen; and which from the mineral character of the rocks, from the imbedded remains of plants, and from their general aspect and arrangement, I would refer to the same epoch, as the great Sewalik group of the N. W. Provinces.

Of these sandstones, several small detached patches occur far within the hills, as in the valley of the Rungeet near Oushok, &c. &c., a fact of great

interest in the history of the formation of these hills. Dr. Hooker was not fortunate enough to have met with any of these, and speculates on the absence of any traces of these rocks.

Associated with this group of rocks, occur the deposits of coal which have been stated to occur in this district. There does not, however, appear to be a sound prospect of the discovery of any seam or bed of coal, sufficient in quantity to form a useful source of supply. In the Sewalik hills to the north-west, beds of lignite and of coal have also been found; but all the analogies of the rocks are against the supposition that such small beds will prove continuous, or large.

Passing now to the Khasia hills, the geological structure is very different. These hills rise from the great flat of the plains almost like a perpendicular wall of rocks, of which the greater portion is composed of sandstones of various tints, often calcareous and ferruginous, all associated with nummulitic limestones. The geological age of these rocks is well marked by this latter deposit, above and immediately in connection with which, occurs the coal of Cherra Poonji. There are no well marked traces of the newer rocks, above the nummulitic group, at Cherra Poonji, while this group rests immediately upon the micaceous, and gneissose metamorphic rocks below. All the known beds of coal in this district, occur in this series of rocks, which must be referred to the older tertiary epoch.

Passing now to the Rajmahal hills we find there resting distinctly and without any other intervening beds, on the metamorphic gneiss and schists of the plains of Bengal, a series of sandstones and shales with coal of a very different character from either of the group above alluded to. The connection of these beds with the great coal-yielding group of Ranigunj, and of the Burdwan coal field is perfectly established not only by the similarity of mineral character and of imbedded fossils, but also by the occurrence, at intervals within the intervening space, of patches of the same rocks, now detached and left as monuments of the vast denudation that has taken place, and of the original continuity of the rocks.

In the Damoodah coal-field it is well known that these rocks are cut up by numerous trappean dykes, but in the Rajmahal hills, the exhibition of volcanic forces has been on an infinitely larger scale. There we find great sheets of lava poured out over these sandstone shales: and this flow of igneous matter again covered up by other mechanically deposited beds, containing fossil remains similar to those in the beds beneath: And this is repeated several times. In all these cases, the uppermost beds of the mechanical rocks have been greatly altered, indurated and baked by the contact of the great mass of molten matter above: while on the several flows of the trappean character, the bedded rocks rests quite unchanged, and in several

instances the lower beds are partially made up of the disintegrated particles of the trap itself, mechanically re-arranged. The evidence is quite conclusive that there have been successive flows of matter in a state of fusion, during a long continued period, during the intervals of which mechanical deposits of sand and mud, often highly charged with vegetable remains took place.

These remains of plants are often remarkably well preserved, and occur so associated, that we must consider the whole series of beds, notwithstanding its interruption by the intercalation of the great masses of foreign matter, as forming one group or formation belonging, generally, to the same geological epoch as the coal-bearing rocks of the Ranigunj district.

The true age of these rocks is one of the most interesting questions of Indian Geology; and anything tending to throw light on it, is of great geological interest. Unfortunately in the Bengal coal-field no animal remains have as yet been found to aid in its solution. And no true or well defined horizon or datum line has been established from which the position of these rocks in the general series can be ascertained. I have already, in a previous number of this Journal, expressed my own opinion on this question; but it may be as well to point out the state of the case more fully.

In the coal-fields of India, numerous remains of fossil plants are found referable to genera, which to European geologists are known only to occur in rocks of a more recent date than the true carboniferous epoch. Associated with these are other genera not hitherto found at all in European rocks, but occurring plentifully in this country, and also in Australia. Now it is well known to every geologist, that the remains of plants alone furnish exceedingly poor evidence on which to base any conclusions with regard to the age of the rocks in which they occur. And this being the case, it is important to find, if possible, fossils belonging to the animal kingdom in connexion with them. Now in Australia, associated with beds containing fossil plants specifically identical with those found in the Indian coal-fields, occur other beds rich in animal remains, of a well marked type, which type represents a period (geological) corresponding to the lower carboniferous group of Europe. It was at first supposed that the beds containing the fossil plants occurred above, and formed a distinct group from the shelly beds; but the observation of all the most trustworthy witnesses negatives this. And in Australia, so far as our present evidence goes, it must, I think be conceded, that the same fossil plants, which in India characterize the coal-yielding beds, occur associated with abundant remains of shells, which must be considered of the carboniferous epoch of European geology. But the question is by no means so easily solved: for passing into Western India, we find associated with identically the same plants, as occur with those

found in the coal-yielding beds of Bengal, numerous remains of shells, &c. which are undoubtedly representatives of the oolitic period (Ammonites, &c.) The evidence here also would seem clear and the statements of Captain Grant in his description of Cutch, would lead us to refer the coal-yielding beds of that district containing Ptilophylla, &c. to the oolitic group. Taking therefore, the analogy of the nearer country, and coupling this with the general analogy, of the fossil plants found in these beds, I am disposed to think that we must *provisionally* consider these coal-bearing rocks of Bengal, as belonging rather to the mesozoic period, than to the palæozoic.

I have stated the difficulties of this question more fully, than may appear needful, because in some recent papers on the geology of India, it has been assumed as perfectly settled and acknowledged; and the whole of the coal-yielding rocks of the country have been unhesitatingly referred to the oolitic epoch, a conclusion by no means established.

The fossils obtained from these beds in the Rajmahal hills are numerous and beautifully preserved; and if not sufficient to decide their geological age will at least add much to our knowledge of the flora of the time.

We have thus traced the occurrence of beds or seams of coal in three distinct districts in Bengal in three formations of very distinct ages, but all of which have hitherto been referred to the same epoch; in the newer tertiary (miocene?) of the Sikim Sub-himalaya; in the older tertiary (eocene) of the Khasia hills; and in the secondary (probably oolitic, possibly carboniferous) rocks of the Rajmahal hills.

While endeavouring to avoid any detail, Mr. Oldham had to apologize for having so far trespassed on the time of the Society, being quite unprepared with diagrams or maps to illustrate his statements. Having come to Calcutta on other business, he had been requested by their Secretary to give a brief outline of the results of the examination of the districts he had visited, and for these results they were indebted to the zealous and untiring labours of his colleagues as much as to himself, labours carried on under difficulties which few geologists can fully appreciate.

#### LIBRARY.

The following additions have been made to the Library since the date of the last report.

#### *Presented.*

Archæologia, Vol. XXXV. p. 2.—BY THE SOCIETY OF ANTIQUARIES.

Proceedings of the Society of Antiquaries of London, Nos. 37 to 40.—BY THE SAME.

List of Members of ditto.—BY THE SAME.

Des Vedas par M. J. Bartholemy Saint Helaire, Paris, 1854, 8vo.—By THE AUTHOR.

Report on the Revenue Administration of the Tenasserim Provinces for 1851-52.—By THE GOVERNMENT OF BENGAL.

Report on the Revenue Administration of the Province of Arracan for 1851-52.—By THE SAME.

Selections from the Public Correspondence of the Punjab Administration, No. VIII.—By THE CHIEF COMMISSIONER OF LAHORE.

Proceedings of the Royal Society of London, No. 4.—By THE SOCIETY.

The Quarterly Journal of the Geological Society, No. 38.—By THE SOCIETY.

The Oriental Christian Spectator for August, 1854.—By THE EDITOR.

The Oriental Baptist, No. 93.—By THE EDITOR.

The Calcutta Christian Observer for September.—By THE EDITORS.

The Upadeshak, No. 93.

The Bibidhartha Sangraha, No. 29.—By THE EDITOR.

*Exchanged.*

The Athenæum for June, 1854.

The Philosophical Magazine, Nos. 47 to 49.

*Purchased.*

Comptes Rendus, Nos. 18 to 24.

Journal des Savants for April and May, 1854.

The Annals and Magazine of Natural History, for July, 1854.

Vuller's Institutiones Linguae Persicæ cum Sanscritâ et Zendicâ Linguae comparatæ.

De Bode's Bokhârâ.

Poper's Behmenjár ben el Marzuban der Persische Aristoteliker aus Avicenna's schule.

Ponsec's French Portuguese and Portuguese French Dictionary, Paris, 1853, 8vo. 2 vols.

Constancio's Portuguese Grammar, Paris, 1849, 12mo.

S'ivasâukirtana, 1854, 12mo.

Bhagavatî Gîtâ, 1853, 12mo.

Jnânârnavâ, 12mo.

Bhaktivartma Pradars'aka, 1853, 8vo.

Kabitâratnâkara, 1830, 8vo.

Sûkabilâs, 1852, 8vo.

Bidagdha Mâdhava, 1849, 8vo.

Házâr masla, 8vo.

Kâyasthadipikâ, 1852, 8vo.

Krishna Lilâmrita, 1848, 8vo.

Jaggannâtha Mangala, 1848, 8vo.



**Keyāmat-nāmah, 8vo.**

**Vidyā Sundara, 1853, 8vo.**

**Sangita Taranga, 1849, 8vo.**

**Bhakta Māla, 1853, 8vo.**

**RA'JENDRALA'L MITTRA'.**

**6th Sept., 1854.**

JOURNAL  
OF THE  
ASIATIC SOCIETY.

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No. VII.—1854.

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*Some account of the Botanical Collection, brought from the eastward, in 1841, by Dr. CANTOR. By the late W. GRIFFITH Esq., F. L. S. Memb. Imp. Acad. Natur. Curios.,—Royal Ratisb. Botan. Soc.,—Corr. Memb. Hort. Soc.,—Royal Acad. Turin,—Assist. Surgeon, Madras Establishment.*

NOTE.—The following paper has been printed for several years and was intended to form part of an interesting communication by Dr. Cantor on the Natural History of Chusan which was to lead off Vol. XXI. of the Asiatic Researches. This publication having been, for the present at all events, discontinued, Dr. Griffith's valuable Memoir on Chusan Botany has been reprinted and is now published with the four plates which accompanied it.—ED.

This collection consists of Plants from the Straits of Malacca, from Lantao, Chusan, and a few from Pekin: the bulk of the Chinese Plants being from Chusan. The Straits' specimens were, I believe, given to Dr. Cantor by the Rev. Mr. White, Chaplain of Singapore.

The following lists exhibit the genera and the number of species procured from the above-mentioned localities: the names of a few species being added:—

No. LXXI.—NEW SERIES. VOL. XXIII.

4 N

## STRAITS OF MALACCA.

## ACOTYLEDONES.

					No. of Species
Lycopodineæ,	...	Lycopodium,	...	...	3
Filices,	...	{	Lygodium,	...	1
			Gleichenia,	...	2
			Polypodium,	...	3
			Aspidium,	...	1
			Asplenium,	...	1
			Blechnum,	...	1
		{	Pteris,	...	1
Total,					13

## DICOTYLEDONES.

## INCOMPLETE.

Taxineæ ?,	...	Dacrydium ?	...	...	1
Urticeæ,	...	Ficus,	...	...	1
Amaranthaceæ,	...	Amaranthus,	...	...	1
Nepenthaceæ,	...	Nepenthes,	...	...	2
Asarineæ,	...	Thottea grandiflora,	...	...	0
Loranthaceæ,	...	Loranthus retusus,	...	...	1
Total,					6

## POLYPETALÆ.

Euphorbiaceæ,	...	Excoecaria,	...	...	1
		Phyllanthus,	...	...	1
		Rottlera,	...	...	1
Bixaceæ,	...	Bixa,	...	...	1
Dilleniaceæ,	...	Tetracera,	...	...	1
Sapindaceæ,	...	Nephelium lappaceum,	...	...	1
Meliaceæ,	...	Aglaia odorata,	...	...	1
Rutaceæ,	...	Evodia triphylla	...	...	1
Ternstroemiaceæ ?	...	Ixonanthes reticulata,	...	...	1
Terebinthaceæ,	...	Boueia microphylla,	...	...	1
Malvaceæ,	...	Paritium,	...	...	1
		Urena,	...	...	1
		Sida,	...	...	1

						No. of Species
Tiliaceæ, ...	...	Grewia, ...	...	...	...	1
Dipterocarpeæ, ...	...	...	...	...	...	1
Connaraceæ, ...	...	Connarus, ...	...	...	...	1
Legumi- nosæ, {	{	Cassiæ, ...	{	Mezoneuron, ...	...	1
		Papilionaceæ, ...		Bauhinia, ...	...	4
				Crotalaria, ...	...	1
Rosaceæ, ...	...	Rubus, ...	...	...	...	1
Memecyleæ, ...	{	Memecylon, ...	...	...	...	1
		Pternandra, ...	...	...	...	2
Melastomaceæ, ...	...	...	...	...	...	3
Myrtaceæ, ...	{	Myrtus tomentosa, ...	...	...	...	1
		Eugenia, ...	...	...	...	4
		Melaleuca Leucadendron, ...	...	...	...	1
		Tristania Whitiana, ...	...	...	...	1
Lythrarieæ, ...	...	Lagerstroemia floribunda, ...	...	...	...	1
Total,						37

## MONOPETALE.

Compositæ, ...	...	Conyza ?	...	...	...	...	1
Rubiaceæ, ...	...	{	Nauclea,	...	...	...	2
			Mussaenda,	...	...	...	1
			Ixora,	...	...	...	1
			Epithinia malayana,	...	...	...	1
Myrsineæ, ...	...	{	Ardisia,	...	...	...	1
			Baeobotrys,	...	...	...	2
Styraceæ, ...	...		Symplocos,	...	...	...	1
Verbenaceæ,	...	{	Clerodendrum,	...	...	...	4
			Callicarpa,	...	...	...	1
			Premna,	...	...	...	1
			Vitex,	...	...	...	1
Total,							17

## LANTAO, CANTON.

## ACOTYLEDONES.

Algae, ...	...	...	...	...	...	1
Lycopodinæ, ...	...	Lycopodium cernuum,	...	...	...	1

				No. of Species
Filices,	...	{	Lygodium, ... ..	1
			Gleichenia, ... ..	1
			Nipholobolus, ... ..	1
			Cheilanthes, ... ..	2
			Adiantum, ... ..	1
			Pteris, ... ..	2
			Cyathea? ... ..	1
Total, ...				11

## MONOCOTYLEDONES.

Cyperaceæ, ...	...	{	Cyperus, ... ..	1
			Scleria, ... ..	1
Gramineæ, ...	...	{	Setaria, ... ..	1
			Imperata, ... ..	1
			Andropogon, ... ..	2
			Anthistiria, ... ..	1
			Bambusa, ... ..	1
Smilacineæ, ...	...		Dianella, ... ..	1
Orchideæ, ...	...		Spiranthes, ... ..	1
Total,				10

## DICOTYLEDONES.

## POLYPETALÆ.

Sterculiaceæ,	...	Helicteres,	...	..	...	...	1
Cucurbitaceæ,	...	Bryonia,	...	..	...	...	1
Oxalidæ,	...	Oxalis,	...	...	...	...	1
Rosaceæ,	...	Rubus moluccanus,	...	...	...	...	1
Leguminosæ,	...	{	Indigofera ?	...	...	...	2
			Lespedeza ?	...	...	...	1
Melastomaceæ,	...	{	Melastoma malabathricum,	...	...	...	1
			———— sanguineum,	...	...	...	1
Myrtaceæ,	...	{	Myrtus tomentosa,	...	...	...	1
			Bæckia frutescens,	...	...	...	1
Total,							11

## MONOPETALÆ.

Compositæ, ...	...	Cirsium? ... ..	1
Rubiaceæ, ...	...	Nauclea Adina, ... ..	1

				No. of Species
Apocynæ,	...	Strophanthus dichotomus,	...	1
Scrophularinæ,	...	Siphonostegia chinensis,	...	1
Acanthacæ,	...	Acanthus ilicifolius,	...	1
				<hr/>
Total,			...	5
				<hr/>

Among a few *Indeterminatæ* are two species of a radicant herbaceous genus, with opposite fleshy leaves, and rubiaceous stipulæ.

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### CHUSAN.

#### ACOTYLEDONES.

Lycopodineæ,	...	Lycopodium,	...	...	...	1
Filices,	...	{	Lygodium,	...	...	1
			Pleopeltis,	...	...	1
			Aspidium,	...	...	3
			Pteris,	...	...	2
				...	...	
			Total,	...	8	

#### MONOCOTYLEDONES.

Cyperacæ,	...	Cyperus,	...	...	...	1
Graminæ,	...	Panicum stagninum,	...	...	...	1
Commelinæ,	...	Commelina,	...	...	...	1
Smilacineæ, ...	...	{	Smilax,	...	...	1
			Scilloidea* (without leaves,)	...	...	1
Orchidæ,	...	...	Eulophia?	...	...	1
Alismacæ,	...	...	Sagittaria,	...	...	1
Hydrocharidæ,	...	...	Hydrocharis Morsus ranæ?*	...	...	1
Lemnacæ,	...	...	Lemna,	...	...	1
						<hr/>
Total,						9
						<hr/>

#### DICOTYLEDONES.

##### INCOMPLETE.

Taxinæ,	...	...	Salisburia,*	...	...	1
Coniferæ,	...	{	Juniperus,	...	...	1
			Pinus,*	...	...	1

				No. of Species	
Amaranthaceæ,	...	Achyranthes,	...	...	1
Polygonæ,	...	{ Polygonum,*	...	...	7
		{ Rumex,*	...	...	2
Elæagnæ,	...	Elæagnus,	...	...	1
Cupuliferæ,	...	Quercus,*	...	...	1
Salicinæ,	...	Salix babylonica,	..	...	1
Urticæ,	...	{ Humulus Lupulus,*	...	...	1
		{ Cannabis sativa,	...	...	1
		{ Morus nigra,	...	...	1
		{ — alba,	...	...	1
		{ Urticea, (fragments,)	...	...	1
		{ Urtica,	...	...	1
		{ Ficus,	...	...	1
		{ Artocarpea ? (fragifera,)	...	...	1
Total,				...	24

## POLYPETALÆ.

Euphorbiaceæ,	...	{ Elæococca verrucosa,*	...	...	1
		{ Stillingia sebifera,	...	...	1
		{ Acalypha,	...	...	1
		{ Phyllanthus,	...	...	2
Ranunculaceæ,	...	{ Ranunculus aquaticus ?	...	...	1
		{ Clematis,*	...	...	1
Nelumbonæ,	...	Nelumbium,	...	...	1
Cruciferae,...	...	Sinapis,	...	...	1
Resedaceæ,	...	Reseda,*	...	...	1
Oxalidæ,	...	Oxalis,	...	...	1
Hypericinæ,	...	Hypericum,*	...	...	2
Ternstroëmiaceæ,	...	Camellia,*	...	...	2
Aurantiaceæ,	...	Citrus,	...	...	3
Meliaceæ,	...	Aglaia,	...	...	1
Ampelidæ,	...	Vitis,	...	...	2
Celastrinæ,	...	Elæodendron,	..	...	1
Rhamnæ,	...	Zyziphus,	...	...	1
Tamariscinæ,	...	Tamarix,	...	...	1
Sempervivæ,	...	Sedum,	...	...	1
Xanthoxylæ,	...	Xanthoxylum,	...	...	1

						No. of Species
Sterculiaceæ,	...	Sterculia,	...	..	...	1
Malvaceæ,	...	{ Hibiscus,	...	...	...	1
		{ Gossypium,	...	...	...	1
Acerineæ,	...	Acer,*	...	...	...	1
Hamamelideæ,	...	Hamamelis sinensis,	...	...	...	1
Rosaceæ,	...	{ Fragaria,	...	..	...	1
		{ Agrimonia,*	...	..	...	1
		{ Rubus,	...	...	...	2
		{ Rosa,	...	...	...	1
		{ Amygdalus,	...	...	..	3
		{ Pyrus,	...	...	...	2
		{ Cydonia,	...	...	...	1
Leguminosæ,	...	Papilionaceæ,	...	...	...	6
Melastomaceæ,	...	Melastoma ? sine fl. fr.	...	...	...	1
Granatæ,	...	Punica Granatum,	..	...	...	1
Myrtaceæ,	...	Myrtus,	...	..	...	1
Araliaceæ,	...	Hedera Helix ?*	...	...	...	1
Umbelliferæ,	...	{ Daucus,	...	...	...	1
		{ Carum,	...	...	...	1
Cucurbitaceæ,	...	{ Cucurbita,	...	...	..	1
		{ Actinostemma, ( <i>gen. nov.</i> )	...	...	...	1
Begoniaceæ,	...	Begonia,	...	...	...	1
Total,						57

## MONOPETALE.

Compositæ,	...	{ Cichoraceæ,	...	...	...	1
		{ Bidens,	...	...	...	1
		{ Artemisia,	...	...	...	2
		{ Eclipta prostrata ?	...	...	...	1
		{ Aster,	...	...	...	1
		{ Chrysanthemum,	...	...	...	1
		{ Pulicaria,	...	...	...	1
		{ Gnaphalium,	...	...	...	1
		{ Emilia,	...	...	...	1
Rubiaceæ,	...	{ Paederia foetida ?*	...	...	...	1
		{ Gardenia,	...	...	...	1
Caprifoliaceæ,	...	Sambucus,*	...	...	...	1
Ericineæ,	...	Rhododendron,* efl. efr.	...	...	...	1
Convolvulaceæ,	...	Convolvulus,	...	...	...	2



				No. of Species
Solaneæ, ...	{	Nicotiana Tabacum, ...	...	1
		Datura fastuosa ? ...	...	1
		Solanum nigrum, ...	...	1
		Dulcamara,* ...	...	1
		Capsicum, ...	...	1
Scrophularinæ, ...	{	Lycium, ...	...	1
		Veronica Anagallis, ...	...	1
Verbenacæ, ...	{	Bonnaya ? ..	...	1
		Verbena officinalis, ...	...	1
Pedalinæ, ...	{	Clerodendrum, ...	...	2
		Sesamum orientale, ...	...	1
Labiata, ...	{	Mentha, ...	...	1
		Rosmarinus officinalis,* ...	...	1
		Labiata alia, ...	...	1
Boraginæ, ...		Symphytum ? ...	...	1
Oleineæ, ...		Olea fragrans, ...	...	1
Plumbaginæ, ...		Plumbago,* ...	...	1
Plantaginæ, ...		Plantago,* ...	...	1
Total, ...				35

*TENGCHOU, (Pekin.)*

Geraniacæ, ...	Erodium, ...	...	...	1
Sempervivæ, ...	Sedum, ...	...	...	1
Umbelliferæ, ...	...	...	...	1
Compositæ, ...	Artemisioides, ...	...	...	1
Indeterminata eflor:	Statice facie, ...	...	...	1
Total, ...				5

*T O K I, (Pekin.)*

## MONOCOTYLEDONES.

Graminæ, ...	Poa vel Festuca, ...	...	...	2
Smilacinæ, ...	Allium, ...	...	...	3
Irideæ, ...	Pardanthus, ...	...	...	1
Total, ...				6

## DICOTYLEDONES.

Polygonæ, ...	...	Polygonum Fagopyrum ?	...	...	1
Urticæ, ...	...	Cannabis sativa,	...	...	1
Tamariscinæ,	...	Tamarix,	...	...	1
Silenacæ, ...	...	Dianthus,	...	...	1
Rosacæ, ...	...	{ Potentilla,	...	...	1
		{ Agrimonia,	...	...	1
Leguminosæ,	...	Papilionacæ,	...	...	4
Primulacæ,	...	Lysimachia,	...	...	1
Asclepiadæ,	...	Cynanchum sibiricum ?	...	...	1
Apocynæ ?	...	...	...	...	1
Convolvulacæ,	...	Convolvulus,	...	...	1
Total,					14

*The total number of Species in a state admitting of determination is as follows:—*

Straits of Malacca, ...	...	...	...	...	...	...	81
Canton, ...	...	...	...	...	...	...	37
Chusan, ...	...	...	...	...	...	...	133
Tengchou, ...	...	} Pekin,	...	...	...	...	25
Toki, ...	...		...	...	...	...	
Total, ...							276

I shall now make such remarks as I am able on the most interesting forms of these collections.

## STRAITS' COLLECTION.

**ASARINÆ.**—The specimens of *Thottea* consist of a flower, part of a raceme, and a full grown leaf. A description and drawing of this plant, first met with by König in 1779, is now in the possession of the Linnean Society.

**TERNSTROMIACÆ?**—I refer with some doubt to this family *Ixonanthes* of Jack. This genus, hitherto only known from Jack's description, has been placed doubtfully among *Cedrelacæ* by Dr. Lindley and M. Endlicher; with which however its resemblances

appear to be rather technical. A more proper place is, I think, to be found between Ternstrœmiaceæ and Hypericineæ, the major part of the affinities being with the former family.

IXONANTHES.—*Jack. Mal. Misc. (Calc. Journ. Nat. Hist. 4. p. 115.)*

CHAR. GEN.—*Calyx* 5-6-partitus. *Corolla* 5-6-petala, glutinosa, convoluta-clausa. *Stamina* 10-20; filamentis capillaceis; antheris ovatis, bilocularibus. *Annulus* (crenulatus) inter stamina et pistillum. *Ovarium* 5-loculare, loculis biovulatis. *Ovula* pendula ex apice anguli interioris. *Stylus* capillaceus. *Stigma* discoideum. *Fructus* septicidim 5-valvis. *Semina* cum vel absque ala, sæpe sterilia et difformia. *Albumen* carnosum. *Embryo* lateralis. *Radicalula* supera.

HABITUS.—Arbores *malayanæ* Folia *alterna, exstipulata? venatione reticulata*. Corymbi *cymæve axillares*. Flores *parvi, inconspicui*.

*I. reticulata*, foliis obovatis vel elliptico-obovatis integris, corymbis folia subæquantibus, staminibus 10, seminibus apice alatis.

*I. reticulata.* *Jack. Mal. Misc. (Calc. Journ. Nat. Hist. 1. c.)*

HAB.—Singapore, *Rev. Mr. White*.

DESCR.\*—*Rami* angulati, flexuosi. *Folia* obovata, vel majora elliptico-obovata, obtusissima, late emarginata coriacea; venæ secundariæ arcuatim nexæ, interveniæ reticulatæ. *Pedunculi* axillares, solitarii, folia subæquantia vel excedentia, dichotomi. *Pedicelli* plerumque ternati, *Flores* cujusve cymæ sub-7, materie resinosa glutinosa aspersa, parvi. *Sepala* ovato-oblonga vel rotundata. *Petala* paullo majora, convoluta, apice quasi perforata. *Stamina* 10, in annulo glanduloso crenulato ovarii basin arete cingente inserta. *Filamenta* capillacea, petalis 4 plo longiora, per os angustum corollæ longe exserta. *Antheræ* oblongæ, basi affixæ; connectivo lato; loculis angustis. *Ovarium* globoso-conicum. *Stylus* capillaceus, filamentis longior. *Stigma* discoideum.

*I. dodecandra*, (n. sp. ?) foliis obovata-lanceolatis crenato-serratis, corymbis felia superantibus, staminibus 13-16, seminibus perfectis paucis hilo processigeris, sterilibus difformibus processibus hili sæpius tricuribus.

\* From a single specimen in flower.

HABIT.—Woods about Pringitt, and near Rhim, Malacca.

DESCR.\*—*Arbor* majuscula. *Folia* alterna, exstipulata, breve petiolata, obovato-lanceolata, obtusa, emarginata, coriacea, crenato-serrata (sæpius distanter,) subtus reticulata, sicca castaneo-brunea: magnitudine varia, majora nempe 6-uncias longa, 2-lata, minora long. 3-uncialia, lat. 1-uncialia. *Corymbi* axillares, folia excedentes, multiflori, *e cymis* dichotomis sub-6-floris conflati. *Bracteæ* caducæ. *Flores* parvi, inconspicui, viridescentes, glutinosi. *Calyx* ultra medium 5 partitus, (potius 5-sepalus, pedicellis apice incrassatis); lacinie corollam fere æquantes, oblongæ, acutæ. *Corolla* convolutoclausa, apice quasi perforata. *Petala* rotundato-oblonga, concava, venosa. *Annulus* brevis, carnosus, crenulatus, inter stamina et pistillum. *Stamina* 13-16. *Filamenta* annulo basin versus inserta, capillacea, diu persistentia. *Antheræ* ovatæ, biloculares, longitudinaliter dehiscentes, deciduæ. *Pollen* tri-porosum. *Ovarium* conicum, sub-5-gonum, 5-loculare. *Ovula* 2 cuius loculo, anatropa, pendula ex apice anguli interioris ope funiculorum longiusculorum. *Raphe* extrorsa. *Stylus* capillaceus, ovario 6-plo longior, stamina paullo superans, diu persistens. *Stigma* capitatum, margine reflexum. *Fructus* anguste ovatus, acutus, 7-8. lineas longus, 3-4-latus, basi calyce et corolla circumdatus, lineis 5 notatus, septicidim 5-valvis, valvis osseis intus centro carinatis. *Semina* sæpius abortientia, processu foraminis sursum et deorsum longe producto, infero sæpius bicruri; *perfectum* brunneum, oblongo-lanceolatum, compressiusculum, processu foraminis sub 3-auriculato. *Tegumentum* exterius coriaceum: interius tenuissimum, albumen arcte vestiens. *Raphe* semi-completa. *Chalaza* subdepressa. *Albumen* carnosum, copiosum. *Embryo* ad latus exterius albuminis. *Radicula* longa, gracilis, longitudine cotyledonum foliacearum. *Plumula* inconspicua.

This species appears to be allied to *T. icosandra*, Jack, from which it chiefly seems to differ in the number of the stamina.

ANACARDIÆÆ.—Compilers appear to have overlooked Buchanan's† remarks on the opposite leaved mangoes, the original species only

\* Chiefly from dried specimens; of the seeds from living ones.

† Mem. Wern. Suc. 5, p. 326.

being referred to by Stouzel\* and Endlicher.† Yet besides the two species founded by Buchanan (loc. cit), I believe without sufficient grounds, on the *Manga sylvestris* prima et altera of Rumph,‡ Buchanan's description of the Burmese Mariam is so different from that of Roxburgh, as to lead to the suspicion, that under the name *Mangifera oppositifolia*, two species will be found.

Up to this time, I have met with three species, of which the following are the distinguishing marks, independently of differences that may exist in their hermaphrodite flowers and fruit.

BOUEIA, § Meisner. || *Cambessedea*, Wight and Arnott. ¶

*B. burmannica*, foliis oblongo-lanceolatis, paniculis laxifloris foliis brevioribus parce puberulis, petalis æpissime 4 lineari-oblongis calycem subduplo excedentibus.

*Mangifera oppositifolia*. \* *Roxb. Hort. Bengh.* p. 18. *Fl. Indic.* 1. p. 640. *ed. Carey.*

*Manga sylvestris*, *Rumph. Hb. Amb.* 1, t. 27 ?

\* Nomenclat. Bot. ed : 2da.

† Gen. Pl. p. 1133, No. 5918.

‡ Rumph. under the head *Manga sylvestris*, does not mention the opposition of the leaves, and though his figure, t. 27, might pass for *Mangifera oppositifolia*, yet the leaves are by no means represented as being generally opposite, and the aspect of the flowers again is rather that of a genuine Mango.

§ This genus was first proposed, and its differences from *Mangifera* given, by Messrs. Wight and Arnott under the name *Cambessedea*, for which, from its being pre-occupied, Meisner has substituted *Boueia*. But no sign or mark is appended to indicate who were the original proposers of the genus, with whom the merit must in most cases necessarily rest. It is one thing to glance over a complete Catalogue of names, and ascertain which is pre-occupied, another to detect and define a new group. Botanists have admitted certain conventional signs, which have been generally adopted, and would do well to admit signs of a most conspicuous character by which the compiler may be known from the designer; the Botanist who names after examination and comparison, from him who names without having done either. Or as suggested in the excellent rules for reforming Zoologic Nomenclature, p. 8, para. 4, now that communication is so rapid, it might be courteously left to the framer of the genus to correct the error.

|| Endl. Gen. Pl. 1. cit.

¶ Prod. Fl. Pen. Ind. Or. p. 170, in *annot.*

\* The opposition of the leaves being characteristic of the genus, it becomes necessary to change Roxburgh's name.

**HABIT.**—Commonly cultivated by the Burmese, by whom it is called *Mariam*, or *Mai-een*.

*Arbor* parva, ramulis compressis angulatis. *Folia* anguste oblongo-lanceolata, obtuse acuminata vel cuspidata, coriacea, longitudine 5-uncialia, latitudine  $1\frac{1}{2}$ -uncialia. *Stamina* sæpissime 4. *Drupa* magnitudine ovi gallinulæ.

Buchanan describes the inflorescence of his plant as “spica simplicissima foliis multo longior,” and the fruit as, “drupa figura et sapore *Mangiferae indicæ*.” But he appears only to have been acquainted with Roxburgh’s plant through the Hortus Benghalensis, a catalogue containing no characters or discriminative marks.

*B. macrophylla*, (n. sp.) foliis oblongo-lanceolatis, paniculis amplis thyrsoides pubescentibus foliis brevioribus, petalis sæpissime 3 calyce subtriplo longioribus.

**HABIT.**—Malacca. *Roomaniya Baitool* of the Malays.

*Arbor* magna, corona densa. *Ramuli* tetragoni. *Folia* valde coriacea, obtuse et brevi cuspidata, long. 6. 8-uncialia, latit.  $2-2\frac{1}{2}$  uncialia. *Panicula* dense thyrsoides. *Stamina* sæpissime 3.

*B. microphylla*, (n. sp.) foliis lanceolatis, paniculis parvis thyrsoides foliis brevioribus, petalis 4 oblongo-rotundatis calyce duplo longioribus.

**HABIT.**—Malacca. *Roomaniya Paigo* of the Malays.

*Arbor*, ramulis compressis. *Folia* longe et obtuse cuspidata, valde coriacea, longit.  $2-3\frac{1}{2}$  uncialia, latit.  $1-1\frac{1}{2}$  uncialia. *Paniculæ* parvæ, foliis aliquoties breviores. *Flores* minus elongati, minuti. *Drupa* magnitudine ovi gallinulæ.

The habit of these two species is different from that of the Burmese one, the leaves more coriaceous, and the secondary veins, more distinct.

The fruit of both is eaten by the Malays. They have the characteristic acidity, but make excellent pickles.

The genus presents a remarkable analogy with *Oleina*.

**MEMECYLEÆ.**—*Pternandra*, Jack, (*Euyckia*, Blume), though referred by Dr. Lindley to *Melastomaceæ*, appears to me to belong to *Memecyleæ*. The genus is remarkable for its placentation, which is the only instance I am acquainted with of the co-existence of thoroughly parietal placentation with perfect dissepiments, inde-

pendently of any apparent production inwards of any parts of the placental surface. Hypothetically this is explainable by assuming the ovula to be confined to that part of the carpellary leaf with which almost invariably they have no manner of connection. In other words, they may be declared to arise from the back of the carpel leaf, or from the midrib, and the space on either side between it and the inflected margins.\*

Appearances, derived from the examination of *Pternandra cœrulescens*, are not perhaps altogether unfavourable to the supposition, that there is a disturbance in the direction of the carpel leaves analogous to that which affects some, perhaps most *Boraginæ*, by which the true apex of each carpellum is brought close to the base, and in which, as appears to me suggested by the situation of the raphe, the placenta has a disposition to be dorsal; so that if a polysporous placenta be found to exist in a carpellum so constituted, it may, I am inclined to conjecture, be as dorsal as it is in *Pternandra*.

From the evidence afforded by this genus, it would appear, that an "ovarium inferum" may have part of its cavities, or even of its placenta actually *superior*; that is, above the line drawn when the term "ovarium inferum" is made use of; which term, nevertheless, is perhaps quite as admissible in many instances as that of *ovarium adhærens*.

*MYRTACEÆ*.—I refer without doubt to *Tristania*, one of Mr. White's Plants. It is the fourth Indian species of the genus I have met with, the northerly limit of which, so far as yet known, appears to be Moulmein, 17° N. L. This is a fact of some interest, as Mr. Bennett† states, that he is only acquainted with one species found beyond the limits of N. Holland. In connection with this I may mention *Stylidium*, which is perhaps the last Australian form

\* Most of the instances hitherto cited as exhibiting dorsal placentation, appear to me to be untenable, and naturally explicable. But it is certain that Monocotyledonous monstrosities do occur, in which the buds arise from the inner surface of the leaves to the exclusion of the usually gemmiferous margins. Of this I met with a marked instance in a Liliaceous plant in Eastern Afghanistan.

† Pl. Jav. Rar. Pt. 11, p. 128.

that disappears, an instance of the genus having been found by Dr. Voigt about Serampore, and by Lieut. Kittoe at Midnapore. This genus also occurs at Mergui and Moulmein, but has not hitherto been remarked on the Khassya Hills or in Assam. Another Australian form, *Melaleuca Leucadendron*, forms from its abundance in the low littoral tracts of Malacca a very marked feature of vegetation. The northerly limit of this species is Mergui, (12° N. L.), where it occurs in similar localities, but comparatively limited in size and numerical extent.

Three of the four species above alluded to, may be thus distinguished:—

*Tristania burmannica*, ramulis glabris, foliis alternis obovato-lanceolatis glaberrimis, calyce extus pubescente intus cum ovario dense albo-tomentoso, staminum phalangis 4-6-andris.

HABIT.—Hills about Moulmein. No. 76, of a small Burmese Collection sent to Eugland in 1834.

Arbuseulum. *Ramuli et inflorescentia* griseo-puberuli. *Folia* longitudine 4-uncialia, latitudine 1-1½-uncialia *Pedunculi* compressi. *Cymæ* confertifloræ, foliis duplo breviores, pedicelli plerumque terni. *Florum* odor pessimus. *Petala* integra, cum filamentis parce puberula.

*T. merguensis*, ramulis subglabris, foliis alternis spathulato-lanceolatis basi biauriculatis, calyce et ovario puberulis, staminum phalangibus 6-10 andris, capsula semisupera.

HABIT.—Sea-shore of the Island Madamacan, opposite Mergui, in flower in August. No. 235, Herb. Mergui.

*Arbor* ramis pendentibus, *Folia* alterna vel subopposita, subsessilia, longitudine 7-7½ uncialia, latitudine 2-2½-uncialia. *Pedunculi* ancipites, foliis subduplo breviores; pedicelli minute puberuli. *Florum* odor pessimus, stercoraceus. *Petala* alba, denticulata. *Phalanges* petala excedentes. *Capsula* ½ supera, semi-inclusa, loculicidim et septifragim trivalvis, valvis extus transverse rugosulis. *Semina* arcte collateralia, plura paleacea abortiva, pauciora apice alata, fertilia. *Cotyledones* contortuplicatæ.

*T. Whitiana*, foliis alternis spathulato-obovatis parce puberulis, ramulis calyceque extus puberulis, calyce intus et ovario tomentoso-puberulis, staminum phalangibus 2-4 andris.



HABIT.—Singapore. Malayan name *Plowan*. Rev. Mr. White.

*Folia*, in apice ramorum conferta, obtuse cuspidata, longitudine  $4-4\frac{1}{2}$ , latitudine  $1\frac{1}{2}-1\frac{3}{4}$  uncialia; *venæ* secundariæ magis approximatae et parallelae. *Corymbi* folia excedentes, puberuli. *Petala* undulata.

Of these *T. burmannia* is closely allied to *P. obovata* Bennett in Horsf. Pl. Jav. Rar. p. 127. t. 27.

The fourth species was met with sparingly in fruit on Mount Ophir; in the form of its leaves it approaches to *T. obovata*, but the fruit is rounder. The peduncles appear much less branched than in any of the other extra-Australian species, but the degree of adhesion between the calyx and pericarpium is the same. It was observed with *Bæckea frutescens*, three species of *Leptospermum*, and one of *Leucopogon*.\*

I know so little of the Australian species of this genus and family that I am unable to state what value should be attached to the placentation in these four extra-Australian species, to the abortion and deformity of most of the seeds, the wing of the fertile one, and the embryo. The habit and especially geographic distribution would seem to point to some degree of separation. It is to be remembered, however, that Mr. Bennett in the Pl. Jav. Rar., a work of the highest authority, does not remark on any structural peculiarity presented by *Tristania obovata*, his specimens of which, excepting the absence of ripe seeds, appear to have been complete.

RUBIACEÆ.—I notice *Epithinia mayana*, to confirm Messrs. Wight and Arnott's statement, that it has stipulæ. The opposite statement, in the Malayan Miscellanies, I have ascertained was corrected† by Dr. Jack himself in a copy found thrown aside among some

\* The Mount Ophir species of this genus, which is not uncommon at Paddam Bhattoo, differs from that found on the littoral tracts of Malacca in the narrow leaves crowded on short branches, the corolla scarcely partite to the middle, the large hypogynous scales which nearly enclose the ovarium, and the smooth filiform style. For this the name *L. ophirensis* may be proposed.

Indeed it was improbable that an exclusively littoral plant should make its appearance suddenly on an isolated Mountain at an elevation of 2000 feet any where: much more so on Mount Ophir, the productions of which from Paddam Bhattoo upwards are very dissimilar from general Malacca vegetation, approaching much more to that characteristic of Polynesia and Australia?

† Instead of "Stipules none," it is, "stipules short, interpetiolar."

loose papers in the Botanic Gardens. There are at the Botanic Gardens some other MS. corrections which might have been advantageously inserted in the reprint of his writings, undertaken by Sir W. Hooker at the suggestion, I believe, of Dr. Wallich.\*

The disposition of the placentæ and ovula in this genus is curious. The former, or perhaps rather their ovuliferous portions, are confined to the middle of the inner angle of each cell, from which they are produced outwards into the middle. Each bears on its apex two ovula, the upper one of which is erect, the under pendulous; the raphe of both being on that side of the ovulum next the outer wall of the cell. The result, when both ovula are matured, is, that two anatropous seeds of which one is erect and one pendulous, have the radicles of their embryos pointing exactly towards one another.

#### CANTON COLLECTION.

This is entirely tropical, and the only peculiar forms that appear to me to exist in it are *Nauclea Adina*, *Strophanthus dichotomus*, and *Siphonostegia sinensis*. For *Bæckia frutescens* is found on Mount Ophir, with some other Australasian or Polynesian forms, and *Myrtus tomentosa* is to be found in abundance in the Straits of Malacca. But *Siphonostegia*, the specimens of which present additional calycine lobes, is the only local or characteristic form, for *Nauclea* is not only a common Indian genus, but there is, I believe, a Khasiya form that approaches *N. Adina* itself, and *Strophanthus* exists on the N. E. frontier of Bengal, and about Malacca, where it is represented by a very fine species with large horn-like follicles. All the remaining genera, and probably almost all the species, may be met with either on the Tenasserim Coast or on the Eastern frontier of Bengal.

#### CHUSAN COLLECTION.

The list of this collection given at the commencement is not limited to plants actually existing in the collection, but includes a few others, either contained in Dr. Cantor's sketches, or in his conspectus of his collections.† I have attached an asterisk to those

\* Are there any other MSS. of Jack in existence? I find references in Dr. Wallich's hand-writing to a MS. description of *Hoya grandiflora*, in an imperfect copy of Carey's edition of Roxburgh's *Flora Indica*.

† Calc. Journ. Nat. Hist. No. V.

forms which seem to me to be extra-tropical, from which it would appear that the great bulk (about 5-6th) is decidedly tropical.

This collection presents an unusual mixture of form, much of which is perhaps attributable to the effects of cultivation. Almost all the genera are to be met with in "India Orientalis," but I imagine scarcely any other like locality could present such a mixture as that of *Commelina*, *Hydrocharis*, *Salisburia*, *Achyranthes*, *Pinus*, *Aglaia*, *Humulus*, *Lupulus*, *Pæderia*, *Juglans*, *Zingiber*, *Agrimonia*, *Nelumbium*, *Rhododendron* and a Palm.

The most marked northern forms appear to me to be *Hydrocharis*, *Salisburia*, *Pinus*, *Quercus*, *Humulus*, *Lupulus*, *Agrimonia*, *Rhododendron*, *Solanum Dulcamara*?

*Clematis*, *Rumex*, *Camellia*, *Hedera*, *Sambucus* and *Plantago* all admit of some degree of explanation, in as much as these genera may be found at similar levels, but in considerably lower latitudes, in certain parts of the Eastern frontier of Bengal; and some species of *Juniperus* under cultivation seem to defy a great amount of heat.

Other similarities to the Flora of our Eastern frontier, Assam for instance, are indicated by the affinity of the *Quercus* to one from the Khasiya Hills, on which it is, so far as I know, the only European form of that genus; by one of the *Polygonæ* which also occurs in the same direction, and which is remarkable for its armed habit, perfoliate leaves, and bright azure berries, and by the genus *Actinostemma*.

The only parts of this collection which I feel myself at all competent to illustrate, are *Hamamelideæ* and *Cucurbitaceæ*.

**HAMAMELIDÆE.**—The species is *Hamamelis sinensis*, R. Br.; the specimens are in fruit, and look at first sight not unlike some *Grewias*.

The Asiatic plants of this family are *Bucklandia populnea*, two species of *Hamamelis*, one of *Fothergilla*? found by Dr. Falconer, and I believe M. Jacquemont, in Cashmir, and one of *Corylopsis*.\*

#### CORYLOPSIS.

\* *Zuccar. in Sieb. Fl. Japon. fasc. 1. p. 45. t. 19. 20. Endl. Gen. Plant. p. 804. No. 4589.*

**CHAR. GEN.**—*Colyx* semi-inferus, 4-5 dentatus vel partitus. *Petala* 4-5, spathulata vel obovata. *Stamina fertilia* 5, sepalis opposita; antherarum loculi secus

*Sedgwickia*, which I some time ago, from examination of fruit-bearing specimens, referred to *Hamamelidæ*, turns out to be a

centrum longitudinaliter dehiscentes, valvis extrorsum flexis persistentibus; *sterilia* 5, vel plura (sub-15) irregularia. *Ovarium* semi-inferum. *Ovula* solitaria. *Semina* ex-alata.

**HABITUS.**—*Frutices Japonicæ et Himalayanæ, habitu Coryli.* Gemmarum squamæ imbricatæ. Stipulæ scariosæ, caducæ, gemmarum squamas extimas formantes. Folia cordata, mucronato-serrata, pennivenia. Spicæ præciæ, terminales et axillares, basi squamis gemmarum involucrentibus, interdum subpetaloidis stipatæ, pendulæ, sericeopilosæ; fructus induratæ.

**Oss.**—*Hamamelis*, genus propinquum, differt habitu, et petalis elongatis æstivatione spiraliter involutis.

*C. himalayana*, (n. sp.) spicis multifloris, calyce cyathiformi 5-dentato villosa, petalis obovatis quam genitalia longioribus, staminibus fertilibus subinæqualibus pistillo longioribus, sterilibus sub-15, 10 majoribus ante petala, 5 minoribus ante stamina.

**Var. ? A.**—Folia subtus ad venas tantum piloso-tomentosa.

**HABIT.**—Bootan mountains; banks of the river and sides of woods at Tassangsee, alt. 5387 feet; on broken ground about Tongsa, alt. 6527 feet; and near Pangee Minzee Peeza, alt. 7500 feet.

**Var. ? B.**—Folia subtus tomentoso-pilosa.

**HABIT.**—Khasiya Hills; Moflung, alt. 5500 feet, on the broken rocky ground covered with bushes, between the bungalow and the river.

**DESCR.**—*Frutex* arbusculoideus, 6-8 pedalis. *Ramuli* flexuosi, brunneo-rubri. *Gemmæ* floriferæ alternæ, ex axillis foliorum lapsorum, demum pendulæ, superiores præcociores; *squamæ* plures, imbricatæ, ovatæ, scariosæ, extimæ brunnescentes intus sericæ, intimæ lutescentes utrinque sericæ, in bracteas sericeo-hirsutas sensim minorifacæ. *Folia* alterna; *petioli* sub-semuunciales, albido-pubescentes; *lamina* cordato-roundata, breviter cuspidata, mucronato-serrata, coriacea, subtus pubescens, basi sub 9-venia, junior plicata secus venas; venæ secundariæ marginem versus oblique currentes, inferiores latere exteriori 3-5-ties ramosæ, intermedie dichotomæ versus apicem, summæ simplices; intervenia venulis transversis et anastomosantibus reticulatæ. *Spicæ* pendulæ, longit. 1-1½-unciales, multifloræ, sericeo-hirsutæ, *Flores* majusculi, lutei, suaviter odori, hermaphroditti.

*Calyx* breve obconicus 4-5 fidus, lacinii ovatis submembranceis. *Petala* 5, perigyna, lacinia calycinis alterna, lutea, obovata, breve unguiculata, irregularia, majoribus patentibus conduplicato-plicatis, margine involutis; æstivatio aperta.

*Stamina* fertilia 4-5, sepalis opposita, fauci calycis inserta; *filamenta* robusta, breviuscula, fere cylindrica; *antheræ* biloculares, longitudinaliter dehiscentes, valvis coriaceis, extrorsum flexis, dorso mutuo applicitis, persistentibus, *Pollen* globosum, plicis 3 medio 1-porosis. *Stamina* sterilia plura, irregularia, subbi-

species of Liquidambar,\* (*Altingia* of Noronha), on which genus Blume constructed his family Balsamiflue. For this oversight and empty compliment, Dr. Wallich is responsible, as he had Blume's Flora Javæ (in which folio work, the family is defined and the genus figured,) before him during the printing of my MSS.

The family Balsamiflue (Balsamaceæ, Lindl.) appears to be generally considered allied to Platanæ, Salicinæ, and some of their neighbours. And although the structure of Bucklandia was not detailed before 1836, it still appears to me odd, that no indication of the similarity of Liquidambar with Fothergilla had been noticed.

From the great variety in structure presented by Hamamelidæ, in which family, limited as it is in genera and species, plants occur varying in habit, with hermaphrodite or polygamous flowers, with petals or without petals, with a quaternary or quinary number of parts, with definite or indefinite stamina, with simple or valvular dehiscence of anthers, I am inclined to believe that Balsamiflue will be found to be a temporary, or at least a subordinate group. Its present claims to distinction seem to me limited to the male inflorescence and flowers, which are, so far as I can judge from dried

seriata; extiora sæpius dentiformia, interdum subulata, filamentorum basibus sæpius opposita; interiora sæpissime per paria petalis opposita, majora, atroviridia, apicibus subglanduliformibus sæpe recurvis. Ovarium semi-inferum, sericeo-pilosum, biloculare. Styli 2, subulati, staminibus subduplo breviores, apicibus recurvis subdilatis intus stigmatosis. Ovula inloculis solitaria, pendula, anatropha; tegumenta bina; foramen magnum, extus spectans.

Spica fructus pendulæ, induratæ, bracteis orbatæ. Capsula scribebus circiter 4 spiraliter dispositæ, (dimidium inferius calyce tubo indurato corticatum,) biloculares, bivalves, valvis demum septicidim bipartitis, stylisque semi-partis recurvis apiculatis; endocarpium atrum. Semina non visa.

My specimens of the Khasiya plant are in fruit. I have not therefore been able to compare the flowers. The leaves vary much in size, those on the mere leaf-bearing branches being as large as those of the Minza Peeza specimens. These again differ from the other Bootan ones in the spikes being less *precious*, in the length of the styles, and in the longer and pale ferruginous hairyness of the spikes.

This is the fourth species of this genus, two having been defined, and one indicated in the Flora Japonica. (loc. cit.) of the three Japanese species only one, *C. Cesakii*. Zucc. has been hitherto met with in the wild state.

\* Fl. Jav. p. l. t. l. 2.

specimens of the Assam species, deficient in any envelope analogous to a perianth or even partial bracte. Its habit presents nothing peculiar; it is not more characteristic of the "Amental" order than that of *Fothergilla* or *Corylopsis*. Its anthers present no very great peculiarity, particularly if compared with those of *Fothergilla*, while its female flowers are in many essential points closely allied to those of *Bucklandia*, in which, and I take this to be of considerable importance, female capitula also occur, and the ovula are considerably increased in number.

The affinities of *Hamamelidæ* appear to be sufficiently complex, the first step to the simplification, the determination of the true nature of the female perianthium not being settled.\* In addition to those already indicated, a relationship with certain *Laurinæ* may be suggested.

**CUCURBITACEÆ, *Zanoninæ*.**—Of the two plants of this family among the Chusan Plants, one belongs to a genus hitherto, I believe, undescribed.

#### ACTINOSTEMMA.

**CHAR. GEN.**—*Flores* monoici; *masc.* rotati. *Sepala* 5, *acuminata*. *Petala* 5, *acuminatissima*. *Stamina* 5, *soluta*, *antheris* unilocularibus. *Fæm*; *Sepala* et *petala* maris. *Ovarium* 1-loculare; *ovula* 2-4, *parietalia* *apicem* versus *loculi*. *Stylus* 1. *Stigmata* 2, *reniformia*. *Capsula* *echinata*, *semisupera*, *annulata*, ad *annulum* *demum* *circumscissa*. *Semina* *pendula*, *marginem* *exarata*.

**HABITUS.**—Herba *scandens*, *tenera*. Folia *subhastata*, *dentata*. *Cirrhi* *laterales*. Flores *inconspicui*, *viridescentes* *masculi* *paniculati*, *fæminei* *racemosi*, *pedicellis* *medium* *supra* *articulatis*. *Circumscissio* *capsulæ* *per* *annulum* *cicatricis* *perianthii*.

*A. tenerum*.

**HABIT.**—In hedges, Sadiya, Upper Assam, also on the Khasiya Hills.—Chusan, *Dr. Cantor*.

\* I have not been able to ascertain from dried specimens the nature of the envelope of the pistillum of *Liquidambar*. Judging from the Assam specimens, and the resemblance to the same part of *Bucklandia*, it is fairly assumable to be calyx. Blume, however, who has described and figured the genus in detail, represents the envelope as derived from scales, united among each other.

DESCR.—*Planta* scandens, herbacea. *Caulēs* angulati, sulcati, parce puberuli. *Folia* longiuscule petiolata, juniora cordato-hastata, matura fere hastata, acuminata, grosse dentata, dentibus mucrone terminatis, (basilaribus 1 vel 2 glanduliferis,) subtus ad venas puberula. *Cirrho* sæpe apice dichotomi. *Inflorescentia* axillaris, puberula. *Panicula* masculæ foliis sæpius longiores. *Bractea* minutæ, subulatæ. *Flores* caduci, inodori, evolutione centrifugi. *Calyx* profunde 5-partitus, laciniis lineari-lanceolatis, acuminatis, extus puberulis, basi obsolete saccatis. *Petala* alternantia, fundo calycis inserta, breviter unguiculata, e basi lanceolata acuminatissima, univenia, æstivatione subimbricata, margine, uti sepala, glanduloso-denticulata. *Stamina* imo fundo calycis inserta, sepalis opposita, omnino soluta; *filamenta* filiformia, breviuscula; *anthera* extrorsæ, sub-ovatæ, uniloculares, longitudinaliter dehiscentes, *connectivo* glanduloso-papilloso. *Pollen* lanceolatum, tri-plicatum, immersum globosum, granulosum. Rudimentum *Pistilli* nullum.

*Racemi* fæminei pauciflori, flore unico sæpius tantum evoluto. *Pedicelli* prope florem articulati. *Calycis* *tubus* subglobosus, verrucosus. *Stamina* castrata vel deficientia. *Ovarium*  $\frac{1}{2}$  inferum, (parte libera conica verrucosula,) 1-loculare; *placentæ* punctiformes, parietales apicem loculi versus. *Ovula* 2-4, sæpius 4, 2 nempe utroque latere, pendula, anatropa; *tegumenta* bina distincta. *Stylus* brevis, crassus, parce puberulus. *Stigmata* hippocrepiformia. *Fructus* siccus, pendulus, (pedicello petiolo brevior, infra articulum gracili, supra incrassato,) ovatus, apice stigmatis reliquiis notatus, medium versus annulo exsculptus, aculeis viridibus præsertim infra annulum echinatus, apice subglaber, tactu lævi ad annulum circumscissus. *Semina*\* 2, vel sæpius 4, pendula, atro-brunnea, tactu saponacea, compressa, superficie rugosa, margine profunde exarata et varie denticulata. *Embryonis* *cotyledones* ovales, carnosæ; *radicula*, supera, breviuscula, conica; *plumula* conspicua.

This plant has to a considerable degree the habit of *Feuillea tamnifolia*, Humb. et. Kunth. Nov. Gen. et Sp. p. 175. t 140, which appears to be a plant sui generis; it also appears to have considerable affinities with *Sicyos*, with which it agrees in habit.

\* The seeds in the Chusan specimen are plano-convex, and scarcely grooved along the edges.

I am, besides this plant, in possession of the two undermentioned genera of the same sub-family.\*

\* *ГОМФРОГЪНЕ*.—*Flores* monoici ? ; *masc.* rotati. *Sepala* 5. *Petala* 5, lanceolata. *Stamina* 5, soluta, antheris unilocularibus. *Fæm* (tubus clavatus.) *Petala* acuminatissima. *Ovarium* inferum, 1-loculare ; *ovula* 3, pendula ex apice loculi. *Fructus* capsularis, apice truncato dehiscens. *Semina* 2, rugosa, margine incrassato.

*HABITUS*.—Herba *scandens*, *carnosa*, *habitu Cissi*, *foliis pedatis*. Fl. masculi *longe paniculati*, fœminei *racemosi*, *racemis paucifloris nutantibus*. *Petala fl. masculi denticulato-fimbriata*, *pagina papillosa*. Filamenta *ima basi coalita*. *Pedicelli florum fœmineorum articulati*. *Perianthium reflexum*. *Fructus venosus, intercentiis reticulatis*. *Semina utrinque rapheos completa rugoso-marginata*.

*ONS*.—Genus affine *Zanonie* situ stylosum, forma et dehiscencia capsulæ ; *Actinostemmati* calyce pentasepalo, petalis fœminei floris acuminatis, et ovarii unilocularis placentis punctiformibus.

*G. cissiformis*.

*HABIT*.—Budrinath, Himalayan Range. *Mr. Edgeworth*.

*DESCR*.—"Scandens, glaberrima. *Folia* longe petiolata, pedata, foliolis septenis, lanceolatis, inciso-serratis, dentibus mucronulatis. *Cirrhi* oppositifolii, sæpius simplices. Fl. ♂. *racemosi*, in apice ramorum sæpius defoliorum sicut paniculam longissimam formantes, breviter pedicellati, pentameri. *Sepala* et *petala* pubescentia, viridescencia. *Stamina* 5, libera. Fl. ♀ fasciculati, longe pedunculati. *Calycis* lacinie 5, subulatæ persistentes. *Petala* 5, ovata, acuta. *Styli* 3, apice bifidi. *Fructus* subtrigono-campaniformis, apice truncatus et planus, cornutus stylis persistentibus, apice dehiscens, 1-locularis, ex abortu seminis unius dispermus. *Semina* crassa, oblonga, nigra, margine intrassato rugosa, amarissima." *Edgeworth MSS*.

*ENKYLIA*.—*Flores* dioici ? ; *masc.* rotati. *Sepala* 5. *Petala* 3, acuminatissima, æstivatione involuta. (a) *Stamina* 5 ; filamentis complete monadelphis, antheris unilocularibus. *Fæm*. *Perianthium* maris. *Ovarium* inferum, bi-triloculare ; *ovula* in loculis solitaria. *Style* 2-3, basi coaliti, apice bifidi. *Fructus* globosus, medium supra annulatus, trilocularis. *Semina* solitaria, verrucosa-muriculata.

*HABITUS*.—Herbæ *scandentes habitu Cissi*, *pilis articulati mollibus pilosæ*.—*Cirrhi lateralis*. *Folia pedata*, *foliolis quinis, mucronato-crenatis serratisæ*. *Flores paniculati, minuti Baccæ pisiformes*.

*ONS*.—Genus *Actinostemmati* affinis, discrepans habitu, filamentis monadelphis, forma stigmatum, et structura fructus. An *Cyclantheræ* affinis ?

1. *E. digyna*, foliolis subtus glabris, paniculis molliter et parce pubescentibus, petalis fl. fæm. oblongo-lanceolatis acuminatis, stylis 2 basi coalitis, fructibus pubescentibus.

(a) This æstivation it is proper to remark, occurs in, at least, one genuine Cucurbitacea, see *Trichosanthes tuberosa*, Bot. Mag. t. 2703.



The prominent points of the major part of this sub-family (Zanoniæ), seem to me the membranous, scarcely marcescent, often

HABIT.—Khalamkhet, Jingsha, at the foot of the Mishmee Hills; and towards Deelong, on the Mishmee Hills, alt. 2-3000 feet.

DESCR.—*Herba* tenera, scandens, molliter pubescens. *Petoli* subunciales. *Foliola* subtus glaucescentia, lanceolata, acuminata, crenato-serrata vel dentata cum mucrone, supra ad venas parce puberula, subtus glabra. *Cirrhii* laterales. *Panicula* flor. masculorum spithamæ, molliter pubescentes, ramis ascendenti-patentibus. *Bractea* subulate. *Flores* racemoso-fasciculati minutissimi: pedicellis subtus florem articulatis. *Parianthium* rotatum. *Sepala* parce pilosa. *Petala* linearilanceolata, subulato-acuminata. *Columna* staminum brevis, vix exserta. *Antheræ* subreniformes, longitudinaliter dehiscentes. *Panicula* fl. fæm. breviores. *Pedicelli* calycesque pubescentes. *Petala* oblongo-lanceolata, acuminata, undulata. *Stamina* 0. *Ovarium* superum, biloculare, pubescens; *ovula* solitaria, pendula, raphe extrorsa?. *Styli* 2, basi coaliti, bifidi. *Stigmata* simplicia. *Fructus* (immaturus) pubescens.

2. *E. trigyna*, foliolis utrinque pubescentibus, paniculis (fructus) dense pubescenti-hirtis, petalis (fl. fæm.) e basi lanceolata subulato-acuminatissimis, stylis 3 basi discretis, fructibus glabris.

*Zanonia cissoides*, wall?

HABIT.—Below Dewangiri, towards Dairang, Bootan Mountains, alt. 1-500 feet. In very shady moist woods, Myrung, Khasiya Hills, alt. 5000 feet.

DESCR.—Habitus præcedentis. *Caules* et *petoli* dense pubescenti-hirti. *Foliola* lanceolata, ecuminata, crenato-serrata, supra parce pubescentia, subtus ad venas densius. *Cirrhii* laterales. *Panicula* fructus digitum vix excedentes, denae pubescenti-hirtæ, ramis patentibus. *Pedicelli* subtus flores articulati, dense pubescenti-hirti. *Ovarium* glabrum. *Styli* 3, subulati, bifidi. *Stigmata* simplicia. *Bacca* pisi forma et magnitudine, apice stylorum reliquiis distantibus notatæ, medium supra annulatæ, atræ triloculares; *epicarpium* subchartaceum. *Semina* solitaria, cuneata, brunnea, muriculata, margine exarata. *Embryo* conformis, plumula conspicua.

Obs.—I have male specimens of a plant of this genus from Darjeeling, which differ materially from those of *E. digyna*, and which I think belong to a third species. The two, now attempted to be established, require to be examined in the living state.

In my Malacca collection occur specimens of a remarkable plant, which appears to me to belong to this sub-family, although its habit is widely different, being rather that of *Menispermæ*.

*Calyx* minutus irregularis, sub 5-partitus. *Petala* 5, acuminibus subulatis incurvis, *Stamina* 5, soluta. *Antheræ* lineares, uniloculares. Rudimentum *Pistilli*.

elongated floral envelopes, the one-celled anthers with ordinary filaments, connectiva and loculi, the generally capsular, annulated, one-celled fruit with simple parietal placentation, and the pendulous\* etunicate seeds. There does not appear to be any peculiarity in the situation of the cirrhi, the particular nature of which is besides unknown.†

It passes I imagine into typical Cucurbitaceæ through *Zanonia*, in which the placentæ are so produced inwards as to meet in the axis, and still more through *Telfaria*, (*Hook.*) in which there appears to be a tendency to the triadelphous stamina, and which is represented as having horizontal and tunicated seeds.

It affords strong evidence against the hypothesis of the structure of Cucurbitaceous fruit advanced sometime ago by Dr. Wight, and which goes so far as to reverse what has hitherto been found to be the constant disposition of the vegetable leaf. For the gradation is complete (through *Zanonia*)‡ between the entirely and simply parietal placentation of *Actinostemma*, and the more complicated, but still parietal, placentation of typical Cucurbitaceæ.

I regret that it has not been in my power to give an accurate Catalogue of the species contained in the Chinese collections. It cannot be too often insisted on, that the usual necessary means of Botanical determination, and which are characteristic of *scientific*

*Frutex cirrhosus, ferrugineo-pubescent. Folia oblongo-ovata, integra, Menispermoides vel Phytocrenoides. Cirrhi laterales. Paniculæ amplæ, folia excedentes. Flores minuti; perianthium utrumque extus ferrugineo-hirtum.*

Affinis *Natsiato* (Ham.); affinis Cucurbitaceis, *Zanoninis*. An *Euklym* sp.?

\* *Feuillea* is described, (Endl. Gen. p. 934) as having the ovula erect, which probably is an error.

† Compare with this Arnott's character of this sub-family, Lond. Jour. Bot. 3, p. 272.

‡ The structure of the ovarium and fruit of *Zanonia* still appears to be unknown. While the ovula are distinctly parietal the placentæ are produced inwards so as to meet in the axis, resembling in a remarkable degree, the very young state of the placentation of *Coccinia*.

The fruit may be thus described. *Capsula* (clavata) unilocularis, infra apicem annulata, apice plano valvis tribus demum inflexis dehiscens; *placentæ* 3 (trigonæ,) magnæ, usque ad axin productæ. *Semina* cujusque placentæ (fol. corpearium duorum) bina, pendula, etunicata, marginato-alata.

Dr. Arnott, I believe, considers the wing of the seed to be of secondary importance. But the common form of the margin of Cucurbitaceous seeds would seem either to indicate the occurrence of no wing, or if any of two. In either case *Zanonia* appears remarkable.

I subjoin a character of the genus.

*ZANONIA*, Linn.—*Flores* dioici; *Masc. Sepala* 3, *Petala* 5, *Stamina* 5, soluta, *antheris* unilocularibus. *Fœm. Perianthium* maris. *Ovarium* (inferum) unilocu-

institutions, do not exist in India, not even in the Public Botanic Gardens. The only way therefore by which I could hope to attach any interest to this paper was, by confining myself to the genera contained in it, which appeared to me either new to science, or imperfectly known.

### EXPLANATION OF PLATE I.

#### IXONANTHES RETICULATA, DODECANDRA.

##### *I. reticulata.*

1. Flowering branch, natural size.
2. Flower.
3. Same, sepals, upper part of stamina, and style removed.
4. Anther, back view.
5. Ditto, front.
6. Pistillum and lower parts of stamina.

##### *I. dodecandra.*

7. Flower.
8. The same, sepals and upper parts of stamina and style cut away.
9. Pistillum, annulus, and lower parts of the filaments.
10. Part of the annulus and three filaments, inner face.
11. Anther, back view.
12. Ditto, front.
13. Pollen, ( $\frac{1}{3}$  triplet).
14. Situation of petals in bud.
15. Stigma.
16. Ovulum.
17. Ovarium, transverse section.
18. Fruit.
19. Same, dehiscent.
20. Seed.
21. Same, longitudinal section.
22. Abortive seed—*a.* body of the ovulum—*b.* funiculus.

lare, ob placentis intus productis pseudo-triloculare. *Ovula* 6, pendula. *Styli* 3, bipartiti. *Fructus* capsularis, vertice plano valvis tribus dehiscens; *placenta* trigonæ, maximæ, in axi concurrentes. *Semina* marginato-alata.

**HABITUS**—Plantæ *indicae, scandentes, carnosae, glabrae*. Folia indivisa, vel trisecta (Arn). Flores parvi, paniculati, viridescens. Antherarum dehiscencia transversa. Fructus clavatus, subtrigonus, apicem infra annulatus.

**Oss.**—Genus ab aliis subfamilie distinctum, *Alsomitra* excepta?, sepalorum aliquorum cohesione, placentis intus productis, ovulorum numero, et seminibus marginato-alatis. *Z. Vighiana*. Arn. verisimiliter genere excludenda.

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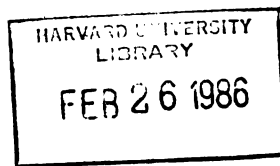
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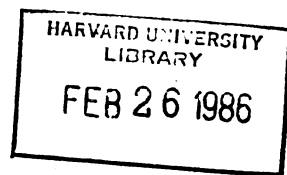
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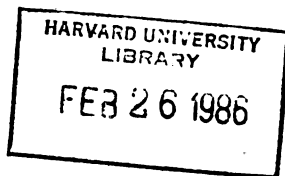




## PLATE II.

*CORYLOPSIS GRATA.*

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## PLATE II.

## CORYLOPSIS GRATA.

1. Flowering branch, var. A.
2. Ditto, var. A. (Minza Peeza).
3. Fruit bearing branch, var. B. } Natural size.
4. Flower.
5. Another laid open, pistillum removed.
6. A petal, cut across.
7. Flower, petals removed.
8. Anther, before dehiscence.
9. Anther, during dehiscence.
10. Anther, fully opened.
11. Stamen, and two of the larger glands, sometime after dehiscence, front view.
12. The same, viewed laterally.
13. Pollen, (in water).
14. Pistillum.
15. Same, longitudinal section.
16. Ovulum.
17. Ditto, longitudinal section.

## PLATE III.

## ACTINOSTEMMA TENERUM.

Male Plant, portion of, natural size.

1. Bud.
2. Ditto, anterior sepal removed.
4. Male organs, sepals and petals removed.
5. Stamina ; front, back, and side views.
6. Pollen in the dry state.
7. Ditto, moistened.
8. Female flower.
9. Pistillum, sepals and petals removed.
10. Another pistillum, ovarium cut through longitudinally.
11. Ovulum.
12. Same, longitudinal section.
13. Long section of a young fruit, shewing two young seeds in situ.
14. The same, young seeds removed to shew the placentation.
15. Fruit.
16. Ditto, opened.

17. Upper part of the fruit with the seeds attached.
  18. Seeds.
  19. Seed, integument half removed to expose the embryo.
  20. Embryo.
- All excepting the portion of the male plant, from fresh specimens.

## PLATE IV.

## GOMPHOGYNE CISSIFORMIS.

## ENKYLIA DIGYNA AND TRIGYNA.

*Gomphogyne cissiformis.*

1. Portion of a female plant, from a dried specimen in the Herbarium of Mr. Edgeworth; natural size.
2. Male flower; front view.
3. Stamen; back and front view.
4. Pollen.
5. Female flower.
6. Fruit.
7. Seed.

*Enkylia digyna.*

1. Portion of a fruit-bearing plant; natural size.
2. Male flower, just expanding.
3. Expanded male-flower.
4. Column of stamens, (base of perianth remaining,) after dehiscence of anthers.
5. Column of stamens, before dehiscence of anthers.
6. Vertical view of the under-face of apex of column.
7. Female flower, just expanding.
8. Vertical Section of ovarium, shewing the pendulous ovula, and the styles united by their bases.

9. *Enkylia trigyna.*

10. Female flower expanded, shewing the long acuminate petals, 3 bifid styles, and smooth ovarium.
  11. Unripe ovarium, bearing the styles.
  12. Ripe bacca, shewing the remains of the three styles, and the annular mark above the middle.
  13. Transverse section of unripe ovarium, shewing three cells.
  14. Ripe seed seen sidewise.
  15. Ditto seen edgewise, shewing the marginal grooves.
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*Notes on the Geology of the Punjab Salt Range, by W. THEOBALD, Junr. Assistant, Geological Survey of India, late of the Punjab Geological Survey.*

The present paper was originally written upwards of three years ago, but has been subsequently revised and curtailed owing to the prior publication of two papers on the same subject, one, a sketch drawn up by Sir R. Murchison from private letters of Dr. Fleming, which appeared in the Quarterly Journal of the Geological Society for August, 1853, and the other the official report of Dr. Fleming, published in the As. Soc. Journ. Nos. 3, 4 and 5 of 1853. From the great discrepancy between these papers, it is certain that the sketch in the Quarterly Journal was published without the knowledge or consent of Dr. Fleming, the theory therein advocated of the eruptive origin of the saliferous rocks, being abandoned in favour of the more mature and correct views set forth in his report to Government. This explanation is due to Dr. Fleming, who in the present instance may well complain of the inconsiderate zeal of his friends at home in his behalf.—W. T.

Before proceeding to describe the Geology of the range, it will, I think, be convenient to give a brief sketch of its physical features and general appearance, particularly as such in a great measure depend on peculiarities in Geological structure. The salt range, which forms as it were a barrier across the upper part of the Sind-Sagur Doab, may be described as a regular and nearly continuous chain of hills, with an included table-land in parts, stretching from the vicinity of Jhilum to Mári on the Indus, a distance of 120 miles in a straight line. A line drawn from Jhilum to Mt. Sakesa, the highest point in the range, nearly indicates the centre of the range between these points, a distance of 104 miles, and bears magnetically 254°. From Mt. Sakesa to Mári on Indus, the distance is 35 miles and the range here makes a sharp bend, the magnetic bearing of this portion of it being 323°. These two lines of bearing including an angle of 69 degrees, are evidently the result of those forces which originally elevated the range, and the regularity of the upheaval is such, that the three principal hills, namely, Tilla, Karingli and Sakesa are situated on one and the same straight line, nearly; each of them too being thrown up by faults transverse to the main axis of the range and striking N. E. and S. W. The width of the range between Mts. Sakesa and Karingli a distance of 65 miles, is

pretty regular, averaging 10 miles, but at either end towards Mári or Jhilum it is not more than 3 miles, and the transition is somewhat abrupt, and due to the higher inclination of the strata there, causing a corresponding decrease in width. Midway however, between Sakesa and Mári the range acquires for a short distance the width of seven miles.

Towards the east the salt range may be said to commence at the celebrated fort of Rhotás, 10 miles W. N. W. from Jhilum, the fort being built on the end of the hilly ridge or spur which tails off from the N. E. declivity of Mt. Tilla. This hill is 3000\* feet above the sea and forms a grand and imposing feature in the district. It rises abruptly and presents an escarped face towards Jhilum and a very steep slope to the N. W. To the W. N. W. it falls rapidly down and merges into the broken ground which skirts and closes up the range along its entire length to the north, and can hardly be termed hilly though very impracticable and deeply excavated by torrents. The portion of the range now to be considered, between Mts. Tilla and Sakesa is in every respect most important. The first considerable hill west of Tilla is Karingli, distant  $23\frac{1}{2}$  miles from it to the W. S. W. and between which a considerable but very circuitous nulla (the Boonah) winds, traversing the range at this point and falling, near Bhimba, into the Jhilum some 14 miles below the station of the same name. Four miles S. S. E. of Karingli is situated the romantic fort of Kusak; perched on a beetling triangular peak or needle, isolated by denudation from the neighbouring table-land and falling with a sheer and precipitous descent towards the plain to the south, which appears spread out beneath it in almost panoramic order. Between Kusak and Karingli the land forms a kind of flat valley, which may be regarded as the commencement of that table-land which stretches with increasing breadth and elevation to the foot of Mt. Sakesa. At its eastern end this table-land is not more than 2200 feet above the sea at most, but towards Sakesa it continuously rises to about 2600 feet, bounded to the

\* For my general ideas respecting the height of the range I am indebted to W. Purdon, Esq. who was at considerable pains to check the few Barometrical observations by the boiling point and by angular measurements where practicable, though from such scanty and disconnected data, approximation is all that can be expected.

north and south by skirting ridges of 200 feet or to greater elevation. These ridges frequently anastomose and give rise to several parallel vallies which need not be specially dwelt upon. Mt. Sakesa, the most considerable hill in the range, is fully 5000 feet in height, but its position among other hills of considerable altitude greatly diminishes the appearance it would otherwise make. It is thrown up across barrier-like and cuts off the table-land which terminates at its base, and to the south graduates into the confused mass of hills called the Patial hills, many of which must be fully 3000 feet high. As previously mentioned, Mt. Sakesa is thrown up by a N. E. to S. W. fault, the beds dipping at a variable but high angle to the N. W. This fault has evidently brought up the saliferous marl to the surface as at the S. E. base of the hill a large salt lake is formed though the salt marl is not fairly seen. A salt lake is also formed in a similar manner, by the saliferous marl being brought to the surface by a fault at Kalla-Kahar, 18 miles due west of Karingli, where however, the fault is not clearly seen, though the marl is pretty plentiful. The Sakesa fault is however, well marked and causes a vertical displacement of strata of certainly 1000 feet and perhaps more. From Mt. Sakesa the range makes an abrupt bend to the N. W. and consists of numerous knife-like ridges, the strata constituting which, are thrown up at a high angle, vertical in places, thereby decreasing the width of the range, to which cause the effects of denudation must be added, which are very forcibly exhibited near Musakhel, twelve miles W. N. W. from Sakesa, situated in a deep bay eaten out of the hills, which at that point are not more than one mile across and perforated by a considerable nulla, that flows from the north and during rain discharges itself into the Indus. To the north along its entire length, the range is bounded by an arid and uninviting tract of broken ground with which it becomes blended and throughout which villages and water are scarce. To this last want rather than to the unkindly nature of the soil, must be attributed the general sterile aspect, as at a greater distance from the range where water and open space are procurable, large villages and tolerable crops attest the capabilities of the soil. Along its southern boundary the range presents much bolder features, being on that side cut off along nearly its entire length by either a



fine escarpment or by a range of huge craggy buttresses, formed by the detachment and subsidence en masse of great slices of the hard upper strata (limestone) of colossal dimensions. Below these again tail off moraine-wise streams of stony debris resulting from the destruction of the various beds of the range; which, when viewed from the plains, represent an interminable series of headlands and promontories, and all the characteristic features of an exposed rocky coast. So evident are the means to which this appearance is due, that the mind almost unconsciously dwells on those fine lines of Shakespear descriptive of a similar scene in a far distant land, and when standing on the verge of the escarpment, one is forced as readily acknowledges their applicability to the scene beneath, as though a mighty ocean still, as of yore, rolled its waves over the land of the five streams.

“ Stand still.—

How fearful

And dizzy 'tis to cast one's eyes so low !

The crows and choughs, that wing the midway air,

Shew scarce so gross as beetles : the murmuring surge,

That on the unnumbered idle pebbles chafes,

Cannot be heard so high.”

As I shall again refer to the physical features of the south side of the range, I will now briefly notice the salt mines. The principal Cis Indus mines are situated at Kiura, six miles north from Pind Dádan Khán and fifty miles from Jhilum, other mines exist near Surdi, Makraj, Varcha, &c. and indeed wherever the saliferous marl is largely developed, but a description of one will suffice, as Kiura mines merely differ from the rest in size and importance. The village of Kiura is situated up one of the gorges, which are so numerous along the southern side of the range, and is built on the tail of the hill in which the mines are situated. The two most important mines (neglecting the Makad and Farwára mines) are the Sujuála and Baggi, which last is a small ill-ventilated mine, the salt from which is a favourite with the merchants, though without any good foundation for the preference shewn it. The road to the Sujuála mine (some twenty minutes walk from the village) is carried along the side of the hill, and rises considerably to the mouth of the

mine. The gallery leading into the mine is very steep as may be imagined by the fact of part of the chamber where the salt is worked, being immediately under the external entrance. The gallery, which is partly natural, partly artificial, passes through marl and gypsum, and averages six feet by three. The form of the mine is an irregular oval, 400 feet long and from 60 to 160 feet broad. The height is probably not less than 35 feet, though this is a mere guess. The floor slopes considerably from the entrance and the brine which percolates through the mine collects along the sides, forming pools, which, by the faint light of the lamps, have a very stygian and doleful aspect. What the thickness of the salt is, it is impossible to ascertain, but some idea of its extent may be formed by the fact of several mines being excavated at different levels in the crystalline salt, each capable of containing a very decent sized house. It by no means, however, follows that the difference of level between the mines necessarily affords any indication of the thickness of the salt, as the whole of this vast bed has been faulted and displaced in the most extraordinary manner.

I now come more particularly to the Geology of the range and should here premise that I have no wish to institute any comparison between the deposits in the Salt Range and similar ones in Europe. The great and interesting problem of geological identity I leave to abler hands and trust that ere long, the collections of fossils forwarded to Europe will have gone far to clear up all doubts on the point and to settle definitely the age of the rocks under consideration. I will add however that regarding the mere lithological characters of the strata, it would not be difficult to identify almost every bed of the permian and saliferous rocks of Europe, in the beds of the salt range, inferior to the nummulite limestone, but in an inversed order to what they present in Europe. In taking a general view of the Geology of the salt range, the question that first of all presents itself is, "What has become of the other half of the range and the rest of those sheets of solid rock, the abrupt and broken edges of which, constitute the escarped and rugged southern margin of the range from Mári to Bhotás, from the Jhilum to the Indus?" This question, though presenting few difficulties to the Geologist, is far from uninteresting, and a brief glance may here be taken at the

state of things which preceded, and the agencies which resulted in, the formation of the Punjab Salt Range as we now see it. As the entire series of rocks under consideration are conformable, from the lowest red marl to the uppermost tertiary bed, it will merely be necessary to imagine, in order to form some idea of the formation of the range, that state of things which existed during the deposition of the uppermost bed of the tertiaries, and which immediately preceded the operation of those forces which led to the upheaval and present form of the range. That radical changes have been constantly in action is not less certain, than that such changes never existed in greater degree, than during the most recent periods of geological history—even confining the observation to the Salt Range. The upper or nummulite limestone, having a close resemblance in many points to the chalk, was without doubt deposited in a similar manner in an oceanic basin, which gradually filling up induced a condition favourable to the deposition of the upper sands and marls which are of an extremely recent (geological) date. These beds are doubtless shallow, estuary or lacustrine deposits, containing as they do, not more than three or four species of shells, (two being a kind of mussel and traces of a univalve or so) but an immense quantity of teeth, bones, and other exuviae of mammalia, crocodiles, tortoises, &c. with fragments of fossil wood and even trunk of trees. Subsequent to the deposition of the earlier beds of these deposits, a gradual subsidence must have occurred, as is proved by the immense thickness of these shallow-water strata, the minimum thickness of which cannot fall below 10,000 feet and probably exceeds double that amount. It is pretty safe to assume that these are identical with the Siwalik tertiaries, but their range to the north, north-west and west will for many years probably, remain unknown, as however they pass into the underlying nummulite limestone, they will probably be found to extend at least as far as that rock which is known to be largely developed throughout Afghanistan. We may now suppose the whole of the tertiaries deposited, and by the continued sinking of the land, covered by the waters of the ocean—for without such an agent, it is difficult to account for the removal of such vast sheets of strata as have every where disappeared, or the formation of that line of cliffs previously described. We should otherwise see

the highest land entirely composed of tertiaries, for what mere atmospheric forces could possibly denude 10,000 feet and more of sands, marls and conglomerates; and even deeply excavate the underlying solid limestone—or where could such agency alone dispose of the debris? It may I think be legitimately allowed that when the first elevatory forces were felt along the axis of the range, the whole, in extended sheets constituted the bottom of an ocean. The force of currents would naturally act with peculiar power on a narrow and elevated ridge of soft strata, and the greatest amount of denudation, possibly occurred previous to their summits emerging above the surface; when however an extended line of coast was raised, the breaching power of the waves could effectually act on the harder strata, and proofs of this power are every where abundant through the range. The table-land often presents a series of vallies excavated in the tertiaries and upper limestone, all discharging themselves to the south over the escarpment or at the head of narrow gorges which enter the range, and which, in many instances, seem to have been excavated backwards in the manner of the well-known Niagara falls, by forces no longer existing. This series of vallies is exactly imitated on a small scale by the channels cut by the retiring tide in a stiff mud bank. A short description of the different beds, is now all that remains to add as a glance at the sections appended to this paper will give an idea of the geological constitution of the range more readily than any long verbal description.

The following are the most important beds in the range with their maximum estimated thickness (ascending).

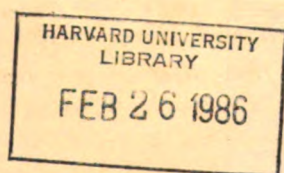
No. 1. Red marl and gypsum with rock salt, .....	1,500
2. Dark red sandstone, fine-grained with black iron-sand partings, .....	700
3. Dark arenaceous shales with green earth, .....	250
4. Cupriferous purple shale, and red friable grits and conglomerates, .....	400
5. Hard fawn-coloured sandstone with bands of conglomerate, .....	700
6. Lower or (productus) limestone, .....	1,100
7. Red and green white spotted shales and sandstones, .....	600

8. Carbonaceous shales, sandstone and lignite, .....	80
9. Upper or Nummulitic limestone, .....	1,100
10. Nummulitic limestone conglomerate, green, red and yellow ossiferous sands, marls, and conglomerates (minimum), .....	10,000
<hr/>	
Total, ....	16,430

Although the aggregate thickness of the strata in the range, cannot be estimated at much less than 6500 feet, yet two or more strata are rarely fully developed at the same point, and the thickness of the different strata vary very considerably at different parts of the range. Thus at Mt. Tilla the upper limestone and spotted sands are each only about 100 feet thick, the maximum thickness of the first rock not being attained before crossing the Indus, the lower limestone is not met with at all, and the fawn-coloured limestone, here largely developed, is soon entirely lost towards the west.

No. 1. Red marl. This formation, for it deserves the name, is largely developed along the entire southern base of the range with occasional exceptions towards either extremity, and is here and there brought to the surface by faults within the range itself, as previously described, at Kalla Kahar, Mt. Sakesa, and doubtfully at some other spots. The colour of the marl is usually a dull crimson red, inclining to plum colour, or purplish towards the upper part where by the intervention of a few arenaceous bands, it passes into the overlying sandstone. It is sometimes met with of an extremely florid colour which seems to be especially the case in the vicinity of trap as in the Kiura gorge and the shoulder of Karingli. The only minerals found in it are small rock crystals, usually marled and imperfect, which occur plentifully at Mári on Indus and Kála Bágh, and sparingly near Nurpur and Sardi. Iron pyrites is also found in small quantities in the gypsum at Sardi and elsewhere. Gypsum occurs in the marl in thick beds evidently stratified, also in thin seams and foliæ, and in large lumps and blocks, but the latter form, is I think, merely the result of the beds of gypsum breaking up and the fragments becoming impacted in the soft and yielding marl by pressure and the movement *en masse* of the lower strata. The handsomest variety of gypsum is the pure white or pink saccharine

Ind 2-6-12 (23)



*Plains towards  
the Indus.*



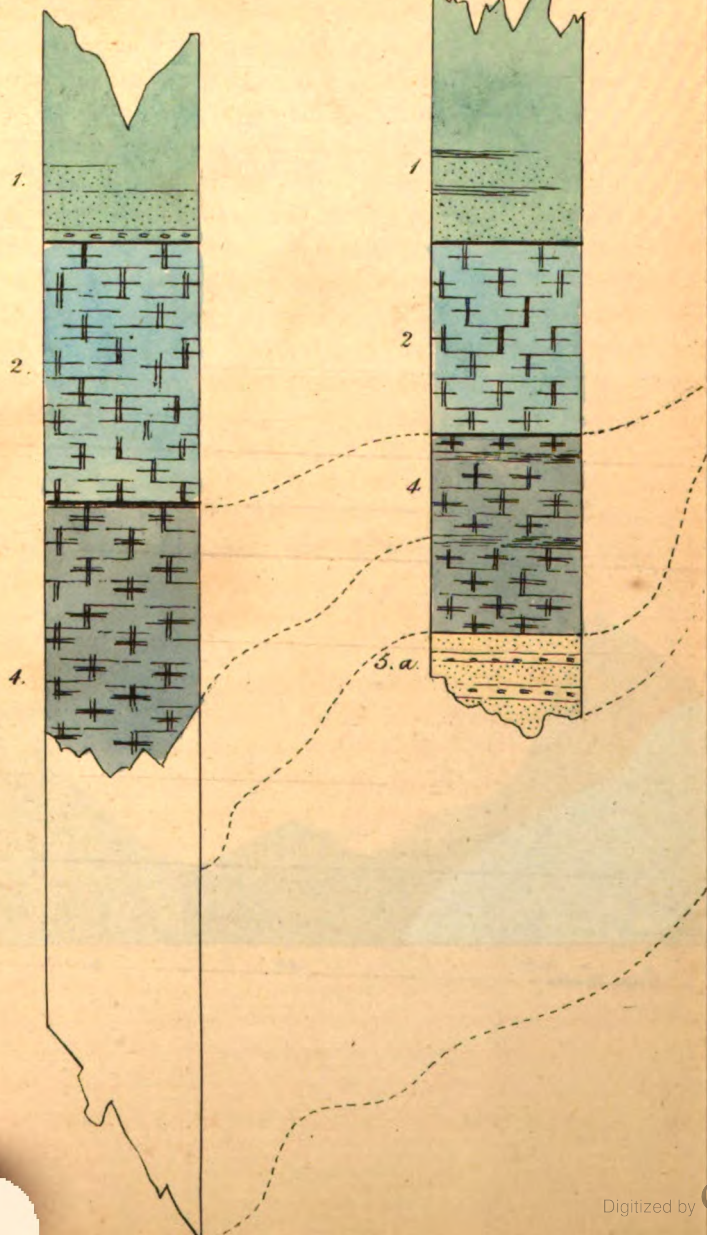
*W.T. junr. del.*

10

Estimate

Kotki Pass.  
W. of Indus.

Swas



kind. It also occurs coarsely crystalline of a greyish white colour, there is also a compact grey kind, but large blocks of the best kinds are not readily got. The ordinary gypsum is greyish white mottled, and varieties occur of various shades of red, brown, and greenish. Small crystals of selenite are also abundant in the marl, which owes its preservation from being washed away in a great measure to this mineral. The gypsum and salt appear to occupy a high position in the marl, but it is difficult to assign them any particular place. The salt occurs in strata of about two feet or more in thickness, separated by a thin parting of red marl, of not more than half an inch, so that the entire body of salt may be regarded as one band of probably not less than 100 feet in thickness. The upper and lower layers of salt decrease in thickness while the partings of marl are proportionately enlarged, and contain coarse granules of salt, so that a blending occurs between the crystalline salt and the red marl which greatly opposes any attempt to examine their junction. The salt is, I believe, in one great band only, but the dislocations which the red marl has suffered, have so broken up the original bed and so altered the levels of the disconnected portions of the sheet, that much obscurity unavoidably exists on this point. The surface planes of the beds of salt are quite parallel and smooth, abruptly terminating and cutting off the cubes of which the bed of salt consists. These cubes dissected out by the action of water in the mine, and standing in high relief, form a really beautiful object when lighted up by the miners' lamps, and the salt even in large blocks possesses a very mild and pleasing translucency. Fractures in the salt usually occur transverse to the bedding, and it is common to see in the mines and galleries, huge cubic fragments depending as it were from the roof as though arrested in the very act of falling. These fragments frequently move, and are arrested before finally coming down, the salt which crumbles from their sharp edges giving timely warning to those beneath. This, together with the fact of the mines being deserted during the most dangerous part of the year (the rains), accounts for the paucity of serious accidents among the miners, who in most instances are the victims of their own carelessness. Most of the falls, oddly enough, seem to take place at night. *In no part of the red marl, have I ever observed a fragment of any foreign rock*



*or fossil of any description.* One curious exception however, must be mentioned, which is the occasional occurrence of small angular fragments of trap at Kiura and elsewhere. The trap is the same that occurs altering the marl in various parts of the range, and every fragment is enveloped in a thin coat of fibrous gypsum, which has evidently separated from the marl and ranged round the trap nucleus as a centre. This gypsum coat is not one-twentieth of an inch thick and the fragments of trap vary from the size of a pea to that of an apple. In the lower part of the red marl occur a few thin bands of a fine compact argillaceous shale and fine argillaceous sandstone, having a few dark filmy partings of a black colour and seemingly carbonaceous character. The shale is compact of a peculiar ashen colour and contains crystals of selenite, which in parts being decomposed give this curious rock a singular honey-combed aspect. The sandstone is fine and thin bedded in the extreme, the strata resembling in arrangement sheets of paper, but the whole is firmly cemented by infiltrated selenite, the crystals of which, form partings between some of the beds and impress a peculiar character on the whole. These beds are singularly contorted, for instance on the left hand side entering the Kiura gorge, and though of very insignificant thickness (some few feet) appear traceable wherever the red marl is much developed.

No. 2. Red sandstone. Above the red marl occur several feet of dark red thin bedded marly sandstones, forming a link between the marl and superincumbent sandstone. This sandstone is greatly developed throughout the range, more so if any where, towards the eastern end where it is fully 600 feet thick. Its colour is dark brick or plum red, and it is generally thin bedded. The upper beds become grayish white, and white and red, but retain the same fine uniform character as the lower. This stone is much used for building, owing to the facility with which it splits into slabs of the required thickness, but is rather soft and its applicability thereby decreased. It absorbs water also readily and is sometimes subject to a saline efflorescence. The pale upper beds, or freestones, though less fissile, are not so faulty in either respect. The red sandstone is rarely, if ever, seen ripple-marked, but the atmospheric action creates curious rugosities in the surface of some of its beds,

dependant seemingly on the varying density of the stone. Throughout this sandstone not even a pebble is observable, but above it occurs a conglomerate from one to six feet in thickness. The paste, which is very scanty, is a greenish arenaceous clay and the pebbles are from the size of a nutmeg to that of a melon, most being of a large size, and consisting of porpheries and primitive rocks well rounded and polished.

No. 3. The beds above the red sandstone consist of a series of sandstones and arenaceous shales about 200 feet thick and pretty generally developed throughout the range. The prevailing colours are gray and green, the shales containing much green earth and indistinct carbonaceous markings.

No. 4. Cupriferous shale. This deposit though rather locally developed, is one of decided interest. It consists chiefly of a purple clay containing granular concretions of copper ore, and of beds of sandstone and conglomerate of a peculiar character also containing traces of copper. The formation does not extend much farther east than Nūrpur, from whence it can be traced to within some ten miles of the Indus. The characteristic purple clay is more circumscribed and is best seen in the vicinity of Kata and between Kata and Musakhel. The lower beds consist of shales and sandstones, of some thickness, then comes a bed of shale containing abundantly balls of radiated sulphate of barytes, and some curious sintery concretions, above this occurs a purple greasy looking shale the most characteristic bed of the whole, and lastly a series of sands and conglomerates fully 250 feet thick in places, and usually forming half or more of the entire deposit. These arenaceous beds are composed chiefly of the sharp sand of granitic rocks and not unfrequently contain crystals of felspar imparting a porphyritic aspect to the sandstone. Some beds indeed so resemble a granitic compound that in hand specimens, they might readily be taken for such. This is especially observable at Nūrpur, where some trappean sublimation has penetrated the pores of one of these beds, which presents the appearance of any thing but a sandstone. The conglomerates do not usually contain very large boulders, but are rather coarse grits of a prevailing red colour with an included pebble here and there. Some of the beds afford unquestionable indications of the simul-

taneous existence of volcanic forces in the vicinity, and the following passage from Lyell's *Elements of Geology* is extremely applicable to the beds in question; it occurs at page 481, treating of the trap of the new red sandstone period. "Some beds of grit mingled with ordinary red marl RESEMBLE SANDS EJECTED FROM A CRATER, and in the stratified conglomerates occurring near Tiverton are many irregular fragments of trap-porphery, some of them one or two tons in weight intermingled with pebbles of other rocks. These angular fragments were probably thrown out from volcanic vents, and fell upon sedimentary matter then in course of deposition." The pebbles in these beds are porpheries, granite, trap, and some of the harder schists, most of them like the Tiverton sands appearing to have passed a fiery ordeal and bearing traces of its action. The copper ore, rather rare in these grits is somewhat more abundant in the purple shale. It occurs in small nodules rarely larger than a pea and is quite insignificant in an economic point of view. The following is an analysis, by Dr. Fleming, of a specimen of the ore from Musakhel, published in the *Delhi Gazette*, 1850.

Copper, .....	75.830
Sulphuret of lead, .....	3.155
Sulphur, .....	21.000
Iron antimony, .....	a trace

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Total,.... 99.985

Dr. Fleming is however, mistaken in naming limestone as the matrix, and was probably misled in this point by the party who furnished him with the specimen.

No. 5. Above the copper shale and perhaps alternating with it occurs a series of sandstones and conglomerates forming an important group. They are mostly highly silicious but some soft beds occur in them. The most remarkable bed is a light coloured extremely hard sandstone weathering of a fawn colour. In the weathered state, some beds so resemble limestone that they have been mistaken for it by, I believe, every one who has treated of the geology of the range, and I was myself under the same impression for some time. It frequently occurs brecciated and cavernous, with seams of carbonate of lime and stalactites in the fissures. It

attains its greatest development at the east end of the range near Baganwalla and Kusak, dwindling away thence westward. The summit of Mt. Tilla and Mt. Karingli and much of the highland near, is of this sandstone. In it occur subordinate beds of a dark blue-grey variety, very hard and silicious, and bands of conglomerate. The boulders in these last beds are granite, porphyry, &c., some few being nearly a ton in weight, and all well rounded and polished. The paste is a sandstone or shale, but some of the finer conglomerates or rather grits are united by a silicious paste, as in some English pudding-stones. The paste of some of these beds and of some of the sands, much resembles chert, and appears to be a chemical deposit. The bands of conglomerate are dispersed irregularly throughout the deposit, and are rarely more than two or three feet thick.

No 6. Lower or productus limestone. Above the last described beds, occurs a series of limestones of great thickness, which may be termed the lower, in contradistinction to the upper or nummulitic limestone. It is first traceable to the east near Nurpur and thence gradually thickens towards the west, till it attains its maximum development across the Indus in the Kotki pass, ten miles N. W. from Kāla Bāgh. The series consists of limestones compact and thin-bedded, with some subordinate arenaceous and shaly beds intermixed. Their arrangement is somewhat complicated and obscure at different points, but the following brief sketch will convey a tolerably correct idea of the whole. The lowest division consists of

*a.* An insignificant deposit of sands of variable thickness: above which occurs

*b.* A deposit of limestones of various characters, fully 600 feet thick: lastly.

*c.* A series of sands, shales and limestones, of about 500 feet in thickness.

*a.* The only remarkable bed in this division is a coarse silicious sandstone, with some calcarious matter and carbonaceous stains and bits of lignite. Its colour is a pretty pure white, and in appearance it resembles some of the Fontainebleau sands.

*b.* This is a most important division, and comprises a variety of limestones mostly highly fossiliferous. The prevailing colour is a dark or light grey, the beds being usually compact, thick-bedded, and contain-

ing numerous fossils. (Terebratula, productus, spirifer, orthis, &c., with corals tubular and retiform, and bones of fishes.) The beds in which these fossils are most numerous are thin beds of a shaly character, but they also occur in the most compact limestone. These lower limestones are much fissured, the cracks dividing fossils as neatly as could be effected by a saw, and the surfaces being often re-cemented by pure white calcspar. Above these dark limestones occur several light yellowish limestones abounding in encrinites. The most common colours are greyish, white or yellow, and some of the beds would yield an excellent and beautiful marble. The very yellow varieties, however, seem rather soft and impure, owing their colour to the presence of argil and iron, and weathering into irregular holes filled with a ferruginous yellow clay. The fossils in this limestone are not numerous, with the exception of encrinites, and these are frequently obliterated by the crystalline character of the stone.

c. The third division is represented in the salt range by a series of sandstones and arenaceous shales with a few beds of limestone. The sands contain much iron and are of a reddish or yellowish white colour, a few traces of plants being all the fossils they contain. At Kotki, however, ten miles N. W. from Kála Bágh, this division is fully as thick as the lower, and besides shales and sandstones contains many thin-bedded limestones, some of them oolitic in structure. The most interesting bed is an arenaceous shale of a very peculiar brown or greenish-brown colour. This bed altogether is not much less than 100 feet thick, and contains the bones and teeth of some large saurian (?), the remains of a few crustaceans, and some five or six genera of bivalves including a gryphæa; but the most numerous fossils are belemnites, which in places are absolutely more in bulk than the including matrix. They swarm by myriads, and are accompanied by a few ammonites, usually in a bad state of preservation, whilst the belemnites are in the most perfect state possible. The fossils in this bed (except the belemnites, which occur throughout,) are not found indiscriminately but usually associated, so that one or two species constitute a marked band, though the lithological character varies but little. The lower part alone contains fossils; the upper half being quite devoid of them, even of belemnites. The bones in this bed are rather friable, but not ill-preserved; and the

teeth, though brittle, are pretty perfect : one I noticed that, when perfect, could not have been much under five inches in length : these teeth are conical, black, and finely striated. This interesting bed is high up in the series, and might perhaps be advantageously separated from it. The other beds met with at Kotki are sandstones of the character previously described, and a great deposit of thin-bedded limestones. Many of these are devoid of fossils ; others again are quite shell-limestones, consisting of broken and undistinguishable fragments of shells, some few having an oolitic structure. Here also occurs a very curious band, some six inches thick, of oolitic limestone passing into shell limestone. To the eye it appears like a brown sandstone ; but when examined with a glass is found to consist of an infinite number of globules less in size than those precious pills, which many in these enlightened times find small difficulty in swallowing. These globules have a lustre like burnished gold, and some are finely tarnished. They are unaffected by an acid, which dissolves the calcareous cement by which they are united ; and appear to be a peculiar indurated clay, though I am unable to speak confidently regarding their composition. One curious point regarding this series is the suddenness with which fossils appear in it, none of any description to my knowledge being found beneath it ; yet in its lower beds several species occur of *Terebratula*, *Orthis*, *Productus*, *Spirifer*, &c. with several corals, bones and teeth of fish, &c. Higher up encrinites abound, with chambered shells, nautili,\* ceratites, &c., and higher still (trans-Indus), *Gryphæa*, with ammonites and belemnites in abundance.†

\* Vide Dr. Fleming's Report, J. A. S.

† As regards the existence of ceratites and orthoceratites in the same band, I am in the last degree sceptical. Throughout the range or even Trans-Indus, I have never seen an orthoceratite ; though that is no proof that they may not be found : but some of the belemnites are so large that their chambered portion might readily, under some circumstances, be taken for part of an orthoceratite. But this explanation is unsatisfactory, as belemnites are rare (if they occur at all) in the ceratite beds, and they are certainly most common in the bed previously described as high in the series at Kotki, and they are rare in the range. Yet the ceratite beds are also high in the series, and this view seems to me worth attention, as long as there remains any doubt whether orthoceratites occur or not. While on the subject of belemnites, I may relate a curious use which has been found for them in these parts

No. 7.—Above the limestone last described occurs a considerable deposit of spotted sandstones and marls, about 700 feet in thickness or less. This deposit is rather circumscribed, occurring only towards the east end of the range. At Mt. Tilla it is seen about 100 feet thick, but soon attains its maximum development at Bāghanwāla, after which it is soon lost to the west. The prevailing tints are red and green. The sandstones are generally a full pinkish red with round white spots, from a quarter of an inch to an inch or more in diameter, they are of moderate hardness and much used for curry-stones and similar purposes. The marls occur red and green, spotted like the sandstones, and present faint marks and casts, as of annelidous animals: no fossils, however, are found in any of the beds. A curious appearance is seen in some of these beds. Many of the sandstones are separated by marl partings, and from their surface crystals are often seen half projecting into the marly layer. These crystals are cubes, with depressed pyramids occupying the face of the cube; their usual size is a quarter of an inch, some even so much as one inch, and they frequently occur marbled. They consist of sandstone, and the hollow faces of the crystals are only seen when the marl enveloping them is removed, when they stand out in relief, studding the surface of the sandstone like so many crystals of bay-salt. All of the beds of this division are much ripple-marked, and the sands and marls alternate pretty regularly.

No. 8.—Beneath the upper or nummulitic limestone, and above the last described sands, occur a few sandstones which are uniformly developed throughout the range. The most characteristic bed is a sandstone of not more than 25 feet in thickness, rather friable and

From an early number of the *Englishman* of 1851, it would appear that a large number of these fossils, many maunds in weight, were collected to serve as fuel for the Indus steamers at Kāla Bāgh. The mystery how belemnites could possibly be mistaken for coal might long have remained unsolved, had not the above statement elicited an angry explanation in another Journal; by which it appeared, that in the orders issued for the discovery of coal, the Persian word for that mineral was mistaken for a somewhat similar one in the same language signifying "*finger*," and the natives accordingly thought that the fingers or belemnites so plentiful on the hills were the objects required, though the uses to which they would be applied by the Feringhis, or the means of rendering them suitable for fuel, must ever have remained a subject of profound and hopeless speculation.

of a whitish colour with carbonaceous markings. This bed is, however, usually associated with carbonaceous shales and lignite of very variable thickness. The deposit is most remarkable for affording the so-called "coals" of the range, to wit, the above carbonaceous shales and lignite. In no part of the range is any fuel that can possibly prove of economic value. The following extract, from a report I submitted on the Bághanwalla "coal" will, I think, confirm this view; that being the only place where there is the least approach to a regular seam.

"Para. 3.—Having satisfied myself as to the state of the road, I commenced working into the face of the seam of coal on the west bank of the nullah, in which it is exposed; but found the quality deteriorate, and, on the third day, the coal had so thinned out and was so earthy, that I relinquished the spot, and recommenced on the east bank where previous excavations had been made, but which was less eligible, as the face of the seam there forms the bed of a transverse gully, which would with difficulty during rain be prevented from filling the works with water. The coal from this spot is as good as the seam affords, and some hundred maunds may be readily obtained by superficial digging."

I may also add that, after lying some time exposed, the whole of the coal mined might be easily screened through a  $\frac{1}{4}$  or  $\frac{1}{2}$  inch sieve. This seam is more free from sulphur (iron pyrites) than is generally the case, and also is associated with small crystals of selenite. The following is a comparison of the Bághanwalla and Kála Bágh lignites.

Volatile matter per cent.

Portion of a large lump of Kála Bágh lignite, colour black, and seemed free from pyrites, .....	53
Bághanwalla lignite in coarse powder, colour brownish-black, .....	34

The position of the Kála Bágh lignite is somewhat different from that in the salt range proper. It occurs indeed beneath the upper limestone, but is a part of that series, as may be seen by the following section:

Section of alum shales at Kotki (Trans-Indus).



No. 8.—Soft yellowish sandstone containing the lignites of the range,..... 25 ft.

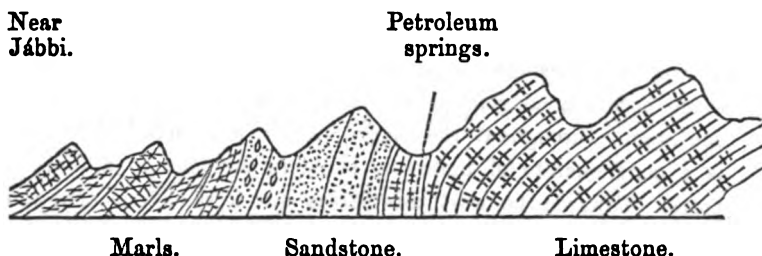
No. 9.—Carbonaceous shale, (alum shales,) containing the Kāla Bāgh coals,..... 25  
 „ Nummulitic limestone,..... 60  
 „ Carbonaceous (alum) shales, with nummulitic limestone bands,..... 80  
 „ Nummulitic limestone,.....

As these beds are merely indicated in the range, the manufacture of alum is confined to the west of the Indus, for which Kāla Bāgh has long been celebrated. The supply of shale or “rol” is quite exhaustless, and is obtained by cutting shafts and galleries into the outcrop of the beds. These workings sometimes ignite spontaneously, and the combustion proceeds very actively, owing to the large amount of jet and carbon in the shales. When at Kāla Bāgh I entered one of these miniature volcanoes, and accidentally selected the *upcast* shaft as my way out; my sufferings in which should act as a warning in future to visitors to the mines: for I can fancy few less pleasant ways of entering into or quitting the world, as the case may be, than through this dread Avernus.

No. 9.—Nummulitic or upper limestone.—This limestone is one of the most important and extensively developed rocks in the range; occurring throughout its entire extent, and forming the greater portion of the table-land and the summit of Mt. Sakesa. It is first seen at the north-west base of Mt. Tilla, but is there not more than 100 feet thick; thence it rapidly becomes thicker, but is not more than 800 feet thick anywhere in the range. At Kotki, however, the thickness is not under 1100 feet, including the shaly associated beds previously mentioned. The prevailing colour of the rock is white and whitish-grey, much of the compact kind being pink, and some of the softer beds are yellow. A few argillaceous and dark bituminous bands occur, but the general character of the rock is pretty pure. Flints are common, generally as nodules, like the English chalk flints, and in strings; but towards the west end of the range and across the Indus the flint also occurs in strata or plates.\*

\* I should previously have mentioned that an impure flint or chert of a yellowish colour occurs sparingly in the lower limestone.

The nodules are generally of a cherty character and of a pinkish or white colour, but towards the west they acquire a dark grey colour or even black, and were formerly largely used for the Seikh muskets, though tougher than good English flints and more splintery besides. The whole limestone is extremely fossiliferous; abounding in nummulites, and many species of bivalves and univalves of a very modern character: shark's teeth and echinoderms are also not uncommon; but no corals are seen, neither are any fossils common to the upper and lower limestones, though in places separated by only a few intervening beds. In this limestone sulphur occurs and petroleum, at a few places at the west end of the range. The most considerable flow of petroleum takes place at Jábbi, nine miles south-east of Kála Bágh. The following sketch explains its mode of occurrence.



The oil ascends with some water and accumulates in pools till collected by the natives. It is very fluid and of a deep rich red brown, quite devoid of that peculiar green tint of the Rangoon oil. It is chiefly used as an application to mangy camels. The sulphur is found in small lumps and crystals in the limestone not far off. The rock containing it does not effervesce, and resembles gypsum. The pink varieties of the limestone would make handsome marbles; but the natives are unable to dress so hard a stone with the chisel, or rather are ignorant of the process: they cut it, however, with emery and sand into a variety of small articles. A very handsome but soft mottled marble occurs near Sardi; it is of a purplish colour, finely imitative of woody fibre, and is rather I think a bed above the limestone, and one of the tertiary series. Near the petroleum

locality mentioned above, occur some beds subordinate to the limestone, which are worthy of notice. They appear originally to have been a shaly limestone, subsequently subjected to a peculiar action, which has given rise to a number of concretions, causing the whole closely to resemble a conglomerate. These bodies are flattened spheres or ovoids, varying in size from that of a pea to a small apple, the most regular being the size and shape of a flat plum and weathering out of the soft matrix; they are numerous enough in places to hide the ground. They have a conchoidal fracture, and exhibit wavy lines and watering like Egyptian jasper, often but not invariably a nummulite being the nucleus, round which the crystalline particles have ranged themselves; sometimes only a portion of this nucleus remains, the rest having become merged in the substance of the nodule. Their prevailing colour is brown, of various shades of yellow and red. A somewhat similar rock is associated with the mottled limestone before described, near Sardi.

No. 10. Limestone conglomerate.—Above the last described limestone occurs a conglomerate of a somewhat varied character, but continuous throughout the range. At the east end of the range it is a conglomerate of limestone boulders included in a limestone paste. Towards the west this passes into a sandstone containing many small nummulites, and across the Indus it is represented by a coarse grit, with an occasional limestone pebble included. The pebbles vary, but are usually small; some however are several pounds weight. The limestone composing them is subcrystalline, of a yellow or pinkish colour, and has a conchoidal fracture. It does not contain any fossil, but is doubtless referrible to the upper limestone series; and I have a faint idea of having seen a nummulite in it, but such a case is rare. The pebbles are of limestone alone, and of one kind. The limestone-paste abounds in nummulites, which almost constitute the paste in parts, as at Nurpur, where it also contains mammalian bones, but sparingly: it is in fact one of the upper tertiary series, in many of the lower beds of which nummulites occur, shewing a gradual change from one formation to the other.

No. 11. Upper tertiary ossiferous sands and marls.—This series, if not the most interesting, is one of the most extensive in the range. Ten thousand feet is probably not one-half of its actual thickness;

for to the north it stretches like a boundless sea, as far as the weary eye can follow, presenting a seemingly interminable succession of sands and marls alternating with the greatest regularity. The following section will convey an idea of the mode of occurrence of the different beds.

Section near Jábbi, ascending order.

Nummulite limestone, . . . . .	feet. No. 9.
Nummulite sandstone, . . . . .	40 No. 10.
Red and white marls, . . . . .	80 No. 11.
Soft greenish sandstone, . . . . .	90
Coarse band, (marly and concretionary,) . . . . .	4
Fine greenish sandstones, . . . . .	180
Green arenaceous marl, . . . . .	15
Greenish sandstone with ferruginous spherules, . . . . .	80
Coarse band, . . . . .	3
Greenish sandstones with 4 coarse bands, . . . . .	140
Coarse pebbly band, . . . . .	15
Red marl, . . . . .	15
Green sandstone with coarse yellowish bands, . . . . .	80
Red marl, . . . . .	10
Coarse pebbly band, . . . . .	40
Red marl, . . . . .	80
Coarse and fine arenaceous beds, . . . . .	70
Red marl, . . . . .	90
Fine sandstone, . . . . .	60
Red and white banded marls, . . . . .	150
Sands, marls and pebbly bands, . . . . .	

The sandstones are usually soft and contain a few pebbles. Their colour is mostly greenish, also white, reddish, or grey. The marls are dull red, or red and white banded. The coarse bands are beds of a concretionary marl, resembling a conglomerate, but rarely containing pebbles. Their colour is mostly yellow, or reddish-yellow and brown. Though fossils are found throughout the series, it is only in a few places that they occur at all numerously. Towards the west of the range, the bones found are little better than mere fragments past recognition; but to the east they are not only more numerous, but well preserved. Near Kulla Kahar east of the salt

lake, bones are pretty numerous ; entire ribs, the pelvis, teeth, and limb-bones, more or less perfect but very friable, or rather shattered : owing to local disturbance of the soft sandstones. The teeth met with are usually well preserved, and their hardness and consequent preservation together with that of the bones would appear to bear an inverse ratio to that of the matrix. A soft sandstone or marl usually affording the finest fossils. In the very hard bands the bones are often soft and friable in the extreme. The fossils are usually completely mineralized, though very many adhere to the tongue, and this character is observed in the weathered surface of many of the best preserved. A narrow ferruginous band between Rhotás and Tilla, of not many inches in thickness, contains many well preserved specimens : among them I may mention a small but very perfect lower molar of an elephant with the jaw attached. The teeth are mostly those of deer and large pachyderms, and the total absence of all carnivorous remains is a striking feature in the deposit. The remains of tortoises are also very common, sometimes an entire case of one being seen. Near Jalálpur a very perfect one was seen fully three feet in length. The teeth of crocodiles are also very numerous in particular bands, usually of a small size but well preserved and beautifully polished. I also procured part of the upper and lower jaws of one of these animals of a small size near Jalálpur. These last remains are usually found in marly beds, the others in sandstone or marl. I also procured some fine specimens from Lehri N. of Rhotás, though I was unfortunately unable personally to visit the locality.

Another and by no means unimportant group of sandstones occurs in many parts of the range, resting unconformably on the last described ossiferous series and the underlying nummulite limestone where denuded. These beds are locally developed, occurring most extensively in the nulla near Jalálpur, about one mile from the village and behind Nowshera, 12 miles east of Mt. Sakesa. The beds in the first locality consist of very soft argillaceous sandstones, thick-bedded and imperfectly stratified, with thick beds of shingly conglomerate almost entirely made up of nummulite limestone boulders. I may here mention that many beds in the ossiferous series (as at Jalálpur) are conglomerates of nummulite limestone

and red sandstone, identical with that overlying the saliferous marl of the range, which proves that great physical changes must have been going on at no great distance, simultaneously with the deposition of the upper beds of the ossiferous tertiaries, to which portion (the upper) they would appear to belong; as also the thick-bedded conglomerates consisting of boulders of all the harder plutonic and metamorphic rocks, which are seen close under Rhotás fort, and resemble nothing more than huge sheets of mortar, the illusion being increased by the crumbling bastions above, of which they at first sight seem the artificial and veritable foundations. These mortar-like beds are nowhere developed in the range save near Rhotás, but are again met with Trans-Indus behind Kála Bágh; and as such an enormous succession of fine sands and marls is met with in the range, it may fairly be conjectured that these "mortar beds" are confined to, and constitute the upper portion of the ossiferous series, of which they undoubtedly form an integral part as seen near Rhotás. The thickness of the unconformable beds near Jalálpur is not very great, but near Nowshera must range to 3 or 400 feet.

At Jalálpur the tertiaries dip  $40^{\circ}$  to  $50^{\circ}$  to the south gradually, becoming vertical on ascending the nulla; the dip then wavers somewhat, though always high, and then gradually declines  $40^{\circ}$  to  $20^{\circ}$  north. The upper beds near Jalálpur are conglomerates, then come (descending) red and yellow marls banded with greenish sandstones, then sandstones with some bands of marl, and the lowest beds are a vast number of fine sandstones and pebbly grits, with but little marl. The whole evidently being very high in the series: and this is curious in one respect, as where the beds are vertical, a portion of the true saliferous gypseous marl of the range has become intercalated, simulating an actual bed in the tertiaries. A bed of red sandstone occurs above it, but whether it has also been intercalated, or is a mere accidental variety of a tertiary sandstone, is not easy to decide; since the lower rocks are in close proximity to the tertiaries on either side, and the faulting and disturbance in this part has been very extensive and complicated. In this case a cursory examination would lead to the idea of an actual saliferous marl occurring in the tertiaries, especially as many marls of that series bear a very strong resemblance to the true salt marl; but it is to be

doubted if any tertiary bed is *per se* saliferous, in the ordinary meaning of the term. It is true, many of them become much impregnated with salt, owing to the vicinity of rock salt in the true salt-marl, even where this rock may not be actually exposed; but throughout the vast series of marls exposed in the range, no instance occurs of their yielding a brine which is not plainly derived from the salt marl and rock salt. The tertiary marls yielding brine, as mentioned by Major Vicary and others, must in all probability be so circumstanced; being evidently the same ossiferous series that occurs in the Range, the brine being derived from some deep-seated bed of rock-salt or marl corresponding to the salt-marl of the Range.

The last deposit to be noticed in connection with the range is one of the most recent date. It consists of a confused and mostly unstratified accumulation of debris, forming a fringing talus along the entire south base of the range, not shelving gradually to the plains, but terminating somewhat abruptly in a number of bluffs some 40 feet or so in height, separated at irregular intervals by creeks or inlets, and the whole having evidently once formed a submarine bank, originated in the action of the waves on the crumbling coast-line of the range. It is widest at Pind Dadun Khán, where it is fully three miles broad; one mile, however, may be taken as rather above the average breadth. It consists entirely of debris from the range, and under the hills receives yearly additions by the masses brought down by rain from the hills. From its porosity and dryness, the jungle growing on it is thin and stunted: it forms, however, a valuable grazing tract for camels and other beasts belonging to villagers in the plains.

Having described the stratified rocks of the Range, I may here briefly notice some rocks, which (though not connected with it) are, from their position, not without interest. I allude to the small cluster of hills between the Jhilum and Chináb rivers, called the Karána hills, the most prominent peak of which is 24 miles south south-east (S. S. E.) from the station of Sháhpur, and a little over 40 miles in a direct line from the nearest point in the Salt Range. These hills rise somewhat abruptly from the plains in detached ridges or clumps, the highest scarcely attaining 600 feet. They are composed of a species of slate, the slaty structure being but feebly

developed, and the original planes of stratification with deep ripple markings in places well preserved. The prevailing colour of the slate is gray, stained red and yellowish, and weathering to a dark burnished brown, in which state it presents an intensely ferruginous and burnt aspect, relieved by occasional veins of pure white quartz. These veins occur with no regularity and are rarely of any thickness. Much peroxide of iron is associated with these rocks, and a curious carbonate of lime and iron (vide Mr. Piddington's examination of the ore, J. A. S. Vol. XXII. p. 208), resembling a rich carbonate of iron, but, in reality, rather a carbonate of lime, occurs associated with the quartz veins. One of the largest veins observed was about one foot in thickness, half consisting of pure white quartz, the rest of the curious carbonate of lime and iron examined by Mr. Piddington.

I now come to the consideration of rocks of an igneous character, which, it has been asserted, occur nowhere throughout the Salt Range. Trap however undoubtedly occurs at some few places towards the east end of the range, and in other places signs of a metamorphic action having been exerted on the rocks are pretty plain. On the southern descent of Mt. Tilla, the upper strata are seen much shattered and re-cemented by stalactitic infiltrations, and many beds of shale appear greatly altered and strongly impregnated with iron. This very circumstance may be perhaps rather the cause than the effect, for I need only quote "laterite" as an instance of what singularly deceptive and protean aspects, a rock containing much iron is capable of putting on. The Karána rocks also afford striking instances of that pseudo-slaggy appearance that some ferruginous rocks exhibit, so that perhaps these appearances on Mt. Tilla cannot safely be referred to metamorphic action properly so called. An instance again occurs in the Nilawán ravine below Nurpur, where two beds of sandstone are seen much altered and thrown up at 20° N. N. W., crossing the gorge something in the manner of a low wall. Between them a ferruginous trap rock occurs, which alters and hardens the adjoining rocks to a depth of eighteen inches, and is thus the cause of their standing up like a blackened wall from among the soft unaltered strata. Near Mári also many beds of sandstone appear altered by hot vapours traversing the planes of stratification though to no great extent, the action scarcely affecting more than



the surface. This appearance however should not be confounded with a somewhat similar one also seen in the same beds, and produced by the decomposition of pyrites in the sandstone itself.

I shall now describe an actual trap, which, though far from common, is interesting as a *bonâ fide* representative of its class. This trap occurs only at the east end of the range and is confined to the red salt-marl, and appears in connection with one of the best marked faults in the range (*vide* Choa valley section). It occurs in four places, viz.: 1st, On the east side of the Kiura gorge about half a mile above the village. 2nd, On the west shoulder of Mt. Karingli, in a nulla opposite the small village of Chumbi. 3rd, On the N. W. side of the Makraj gorge, above the waterfall. 4th, In the Nilawán ravine below Nurpur, a short distance from the salt choki; and at a few other spots. The colour of this trap is a dull brownish or reddish purple. It is trachytic, and tolerably compact and hard, and is traversed in every direction by short capillary markings (probably, very minute crystals of tremolite), which in perfectly unweathered specimens are occasionally obsolete.

Although from the nature of that rock, its junction with the red marl is never well seen, yet its action on it is sufficiently well marked. It converts the bright red marl into an orange or cream coloured mass, very vesicular at the immediate point of contact, and containing kernels (as at Nurpur) of a greasy earth, like soap-stone, at other places (Kiura) kernels of a glassy zeolite and geodes with crystals of a similar mineral. The vesicles in the marl are usually coated with an impalpable black, red, or yellow powder.

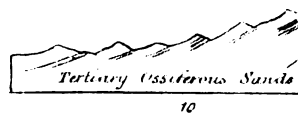
The trap itself changes somewhat in character in contact with the marl, becoming amygdaloidal and otherwise assimilating to that rock. When decomposed, creamy yellow spots become developed in the trap, which gradually enlarge, till the mass becomes converted into a yellowish-white bole, or hard earth traversed in every direction by radiating spiculæ (tremolite?) which seem to exist in a latent form till rendered visible by decomposition.

The gypsum in the vicinity of the trap is rendered coarsely granular and somewhat incoherent. So conclusive is this appearance that it was one of the arguments on which Dr. Fleming based his theory\* of the ERUPTIVE origin of the RED MARL itself, gypseous

\* *Vide* Quarterly Journal Geographical Society, for August, 1853.

*Sec*

*Plains to the North.*



10

*Pale Carmine.*

" *Indian Red.*

" *Indian Ink.*

" *Gamboge.*

" *Neutral Tint.*

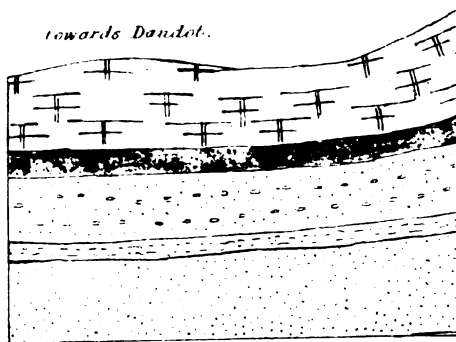
" *Orange.*

" *Cobalt.*

" *Green Verditer.*

*Tertiary*  
 1. *Indian Red*  
 2. *Indian Ink*  
 3. *Gamboge*  
 4. *Neutral Tint*  
 5. *Orange*  
 6. *Cobalt*  
 7. *Green Verditer*

*towards Dandot.*





*W. T. June del.*

2

Field B-C-12 (23)

10  Ossiferous  
Sands Marls,  
and conglomerates.

8.9  &c.

15  Sandstone  
(fawn, coloured)  
& Conglomerates. lower beds form  
the uppermost shale series

3  with,

Scale of Sections. 1000 feet = 1 Inch.

Datum line 300 feet above Sea.

(A.B. and C.)

Pir Maklum Jahani



W. T. Jones delt.

9

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as that rock is throughout its length and breadth; the trap, the obvious cause of the local change in the gypsum, being regarded by Dr. Fleming as an "*altered sandstone or clay*."

This is the trap, fragments of which are previously described as occurring in the marl. I have only observed them at Kiura, in the ravine between Mr. Wright's house and the Sujwālla mine, and in a breccia of red marl and gypsum near the same place, seemingly produced by the intrusion of the main body of trap in the Kiura gorge.

P. S.—For the following notes I am indebted to the kindness of Dr. Falconer, who took the trouble to examine a small collection of fossils from near Jalalpur and Lehri, the result of which, as here given, being of considerable interest, and going far to establish the identity of the Trans-Indus tertiaries and those of the Salt Range with the far-famed Sewalik beds. Two points are especially curious; the perfectness of single teeth and small bones, and the usually sharp fracture of the larger bones, together with their rather *local* abundance; and the total absence or great scarcity of the remains of carnivorous animals.

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*"Notes of some fossils from near Lehri and Jalalpur—Salt Range, Punjab."*

The fossils are for the most part small fragments; the edges are generally sharp, and the most of them are in the ordinary mineral condition of Sewalik-Hill specimens, occurring in a sandstone matrix and impregnated with lime. Some of them adhere to the tongue, besides ivory tusks.

Many of the specimens are, from their fragmentary condition, indeterminable. The following is a rough list of what could readily be made out.

#### PACHYDERMATA.

##### PROBOSCIDIA.

*Elephas*.—A plate of a worn molar; species indeterminable, but probably *E. Hysudricus*.

*Mastodon*.—2 specimens of molar ridges of the Elephantoid or *Stegodon* group; species indeterminable.

2 fragments of ivory tusks.

*Hippopotamidae*.—Tusks of the lower jaw of a larger size than are usually met with in the Sewalik Hexaprotodon, and resembling more the true Hippopotamus or *Tetraprotodon* of the Nerbudda.

*Rhinoceros*.—Upper and lower molars in fragments.

*Equus*.—Upper and lower molars of 2 species.

*Sus*.—Upper jaw.

#### RUMINANTIA.

*Sivatherium*.—Lower jaw (fragment) with tooth.

*Bos*.—Upper and lower molars and fragments of jaws.

*Cervus and Antelope*.—Several species, some of them very minute. Abundance of Astralagi, femur ends, and scapula cups, also fragments of deer horns.

*Camelus*.—Portion of a molar.

#### AVES.

Fragment of a leg bone with the articular surface, of a large form belonging to the Grallæ.

#### REPTILIA.

*Crocodilus and Leptorhynchus (Gavialis)*.—Lower jaws and teeth with vertebræ.

*Trionyx*.—Fragment of the carapace with vertebræ of a large species.

*Fish*.—A vertebra.

#### MOLLUSCA.

A few lime casts of one of the species found in the Sewalik Hills.

There are in the collection a number of indeterminable fragments of other bones.

The characters of the collection are entirely those of the 'Sewalik Hills Fauna as usually met with; with the single exception of the Hippopotamus tusk.

There was in the collection one piece of Endogenous fossil wood resembling the Irrawaddy specimens, found so abundantly near and above Prome.

H. F.

Calcutta, 12th September, 1854.

1 U

lunar race of Hindu princes, and strengthens to a certainty the belief that has generally prevailed amongst Sanskrit scholars, that Porus was not the individual name of the king, but that of his race, as a *Paurava* or descendant of *Puru*. In the spoken language the patronymic is pronounced *Paurav* and *Pauru*, which with the Greeks, became Πῶρος.

The great Porus himself was treacherously murdered by the Greek governor of the Punjab after the death of Alexander, but nothing is recorded of his descendants or of those of his cousin, the second Porus. We know only that as the whole of the Punjab was subjected by Chandra Gupta Maurya, the royal Pauravas must of course have become his tributaries. Some orientalists still affect to doubt the identity of Chandra Gupta and Sandrakoptos, which, though at first only a happy guess of Sir William Jones, was afterwards all but actually proved by the researches of Professor Wilson, who showed that the same private scandal was related of Sandrakoptos by the Greeks, as of Chandra Gupta by the Hindus. I will now add my mite towards settling this important point which is the very corner stone of ancient Indian chronology. Euph Orion,\* who became the librarian of Antiochus the Great in 221 B. C. states that the

Μωριῖς, ἔθνος Ἰνδικόν, ἐν ξυλίνοις δικοῦντες οἴκοις

"the Indian *Morias* live in wooden houses;" to which Hesychius adds

Μωριῖς, οἱ τῶν Ἰνδῶν βασιλεῖς.

These *royal Morias*, who dwelt in wooden houses, must therefore be the same regal *Mauryas*, who lived in the wooden palaces of Pátalíputra or Palibothra.†

During the reigns of Chandra Gupta and of his successors Bimbisara and the great Asoka the province of Taxila was only a dependency of the vast Indian empire of the Mauryas, the governorship being generally held by one of the king's sons. But after the

\* Stephanus Byzantinus, in v. Μωριῖς.

† Nearchus, in Arrian's Indica c. x. says that the Indian cities that were situated on rivers, were built of wood. The bas-reliefs of the Sanchi tope, which were sculptured in the reign of Sátakarni, about A. D. 20, represent palaces of wood with the rafters in perspective.

decline of the Mauryan dynasty, and during the decay of the petty Greek kingdoms of Cabul and the Panjab, it might have been expected that some scion of the royal house of Puru, some second Porus, would have asserted his independence; or that some more daring native adventurer; some ancient Ranjit Singh, would have carved out a kingdom for himself. Some traces of such events may perhaps be seen in the frequent changes of the Indian dynasties of Delhi and Magadha just before the Christian era, as recorded in the *Rajavali* and in the *Puranas*.<sup>\*</sup> This re-assertion of native power and influence may also, I think, be seen in the coins of the accompanying plate, which bear the unmistakeable Hindu names of *Mahigula*, *Jivanisa*, and *Rajabula*.

The corrupt style of the Greek letters and the types, which are imitated from those of Azas and of the later Greek kings, show that these satrap coins must belong to the first century before the Christian era. Now at this very time, the throne of Delhi was occupied by the *Mayura* family, said to be of lunar descent, amongst whom, there occur three princes, whose names differ so little from those of our coins as almost to warrant the conclusion that they are the same. This conclusion is, I think, much strengthened by the prevailing mint mark on the coins of *Rajabula*. It consists of two Pali letters,  $\square \text{ } \text{S}$ , forming the word *Hasti* which I take to be the numismatic contraction for *Hastinapura* on the Ganges, the celebrated ancient capital of the lunar race. It is true that these letters might also stand for *Hastinagara*, the city of Astes, prince of Pukelaotis and the Hashtnagar of the present day. But this is not borne out by the places where the coins have been discovered. Of *Zeionisos*, or *Jivanisa*, only four coins have yet been found, all of which were procured in the Panjab. My two specimens came from Kashmir and Baiwal Pindi. Of *Rajabula* not a single specimen, to my knowledge, has been found to the west of the Chenab. My own coins were obtained at Amritsur, Lahore, Harapa, Shorkot, Tulamba, Kahrur, and Multan, all in the Eastern Panjab; and at Delhi and Mathura on the Jumna. The greatest number were procured at the last place, and were said to have been found in the ruins of the city, along with some rude hemidrachmas of Strato

<sup>\*</sup> See Prinsep's Useful Tables—pp. 98—100.



We have thus the additional evidence of time and place in favour of the identification of these Hindu satraps with their namesakes of the last lunar dynasty of Delhi.

This dynasty is of some importance in Indian history, as the last prince, *Rājapāla*, was vanquished by *Sakkaditya*, or Sakwanti, the chief of the Sākas, or Indo-Scythians, who was himself overcome by the celebrated Vikramaditya, in the year 56½ B. C. On this victory, the conqueror assumed the title of *Sakkari* or "foe of the Sakas," and from it, the Hindus have dated one of their principal eras, the Vikramaditya Sambat, which is still in use.

The names of the princes of the Mayura dynasty of Delhi are given by Tod\* from the Rājāvali, by James Prinsep† from Tod, and by Ward‡ from the brāhmanas of Bengal. As these lists differ from each other, and from a third in my own possession, which was obtained from a learned purohit in the Punjab, I think it is highly probable that all three are more or less faulty in the spelling of the names, of which the true orthography may have been preserved by the coins. In Prinsep's list, which is copied from Tod, the name of the founder of the dynasty has been omitted by mistake; and the two names immediately preceding his last are formed by the division of the penultimate name of our lists, and our fourth name is omitted altogether, probably owing to its similarity with the preceding one. But there is still so close an agreement in the names of the three lists, as to warrant our confidence in their general accuracy. I now give the different lists with the probable date of the accession of each prince.

#### MAYURA DYNASTY OF DELHI.

	<i>Ward.</i>	<i>Tod, Prinsep.</i>	<i>Cunningham.</i>
B. C. 230	Dhurandhara	Dhudsen	Yonadhara.
210	Senodhata	Senadhwaja	Senadhwaja.
190	Mahākataka	Mahaganga	Mahiganga.
170	Mahayodha	(Caret)	Mahajodh.
150	Nātha	Nāda	Sarma.
130	Jiyana-rāja	Jewana	Jivan-sirāj.

\* Tod's Rājasthan, vol. I. Table II. and page 51.

† Useful Tables, p. 98.

‡ Ward's Hindus, 8vo., vol. I. p. 24.

110	Udaya-Sena	Udiya	Umed-sen.
90	Vindhachala	{ Jchala Ananda }	Anandajala.
70	Rájapála	Rájapála	Rájapála.
60	Delhi taken by Sákáditya or Sakwanti.		
57	Ditto retaken by Vikramaditya Sákári.		

Several of the facts regarding this dynasty, which are recorded in the Rájávali, are also mentioned by Ferishta, but the names are much changed and misplaced. The general agreement of the incidents however, is curious, as Ferishta wrote his history in the south of India just one hundred years before the compilation of the Rájávali by the order of Siwai Jay Singh of Amber. But the Mahomedan historian has a still more striking coincidence with a statement of Polybius, which has been already noticed by James Prinsep,\* who supposed that Ferishta's information was derived "not from the Greeks, but from native authorities now no longer extant." These two statements, which refer to the same period of history, are so exactly alike, and so precise in their language, as to leave no doubt in my mind that they refer to the same person, although the names are different. I will now place the two passages side by side in translations given by authors who were not aware of the coincidence.

*Polybius.*

"Passing Mount Caucasus he (Antiochus) came into India and renewed his alliance with Sophagenus, the Indian prince. In this place he obtained more elephants so that his whole number was now a hundred and fifty."—

*Hampton.†*

In both of these passages, we have the same story of the invasion

*Ferishta.*

"He (Jona) was contemporary with Ardshir Babegán, who invaded India; but being met by Jona with valuable presents of gold and elephants on the frontier, Ardshir was induced to withdraw his army."—*Briggs.‡*

\* See Journ. As. Soc. Bengal, 1838, p. 163.

† Hampton's Polybius, 510.—See I, XI. page 8.—'Ἐπερβαλὼν δὲ τὸν καύκασον, καὶ κατὰρας εἰς τὴν Ἰνδικήν, τὴν τοῦ φίλιαν ἀνευέαστο τὴν πρὸς Σοφαγασήνων τὴν βασιλείαν τῶν Ἰνδῶν, καὶ λαβὼν ἐλέφαντας, ὥστε γενέσθαι τοὺς ἅπαντας εἰς ἑκατὸν καὶ πεντήκοντα.

‡ Briggs's Ferishta, vol. I. p. lxxiv.

of India by the king of Persia, and of the invader's retirement on receiving a number of elephants from the king of India.\* The period at which these invasions took place is also the same, as I will now show. The Greek historian is relating the Indian expedition of Antiochus the Great, which Bayer and others have agreed to fix in B. C. 205. On this occasion, he renewed his alliance with the Indian king. At what time, his original alliance took place is not mentioned, but we may fix it with great probability in B. C. 220, at the close of his first eastern expedition. From 220 to 212 B. C. Antiochus was fully employed in his wars with Ptolemy, and his second eastern expedition lasted from 212 to 205 B. C. The reign of the Indian king may therefore be supposed to have commenced at least as early as that of Antiochus himself, or in B. C. 224.

The Mahomedan historian calls the king of Persia, Ardshir Babegán, which is an evident mistake, as this is the well known name of the founder of the Sassanian dynasty in 226 A. D. I would read Artabán, for Arsaces, 3rd Artabanus, who reigned from B. C. 216 to 196, and was therefore a contemporary of Antiochus the Great, and his Indian ally Sophagasenús. In favour of the correctness of this alteration, we have Ferishta's previous mention of *Gudarz* and *Tirasi†* as the kings of Persia to whom Jona's predecessors had paid tribute. The latter name I would correct to پرسی *Pirasi*, and thus identify the two kings with Gotarzes and Volageses 1st.‡ It is true that the dates of these two princes are much too late for the period of Jona: but it must be remembered that Ferishta had access only to the Persian historians, according to whom *Gudarz* and *Volas* are the fourth and fifth princes of the Ashkanian dynasty. There is an acknowledged confusion in these Persian accounts between Ashkanians and Ashganians; but *Gudarz* and his son *Volas*, the fourth and fifth princes of the former dynasty, are evidently those to whom Ferishta alludes. The Greek and Roman

\* In the original of Ferishta, I find the word "jewels" added to the other gifts which General Briggs has omitted in his translation; وزر و جواهر بسیار و فیلان; "gold and many jewels and elephants."

† کودرز و ترسی — *Gudarz wa Tirasi*.

‡ *Tirasi* may however, as Jas. Primsep suggested, be only a Persian form of *Tiridates*.

historians also differ amongst themselves ; but the commonly received account related that Arsaces, the founder, was succeeded by his brother Tiridates, who was succeeded by his son Artabanus. By omitting the second Ashk of the Persians, who is not mentioned by the western authors, the two accounts will correspond exactly as to relationship, although not in names. Gudarz and his son Pirasi will thus become the third and fourth princes of the dynasty, and be identified with Artabanes and his son Priapatius, who together occupied the Parthian throne from B. C. 216 to 190.

Regarding the date of Jona we have in all the copies of Ferishta the uniform term of seventy years assigned to Sansárchand alone, or to himself and family. If we place the accession of Sansárchand or Sandrakottos in B. C. 312, we shall obtain B. C. 242 for the accession of the Jona Rája of Ferishta ; and as he is said to have reigned ninety years from B. C. 242 to 152, he was a contemporary of Antiochus the Great, during the whole period of his reign.

On referring to my list of the Mayúra dynasty of Delhi, it will be seen that the founder is named *Yavana-dhara* or rather *Yona-dhara*, یوندهر which is the same name as *Yona* or *Jona*. The date which I have assigned to him from B. C. 230 to 210 is not an arbitrary one, but is based upon the interval elapsed between the great war and the victory of Vikramaditya. In Tod's and Ward's lists, the number of princes from Parikshita the son of Arjuna to Rajapala is sixty-six : in my list, the number is sixty-eight. Now allowing an average of twenty years to each reign, the accession of Parikshita will be placed in 1397 B. C., a date which agrees exactly with the close of the great war.\*

Regarding the various names of the founder of this dynasty we may rest satisfied with the explanation given us by Strabo, that it was customary for the princes of this period to have two or three

\* Colebrooke and Davis, 1391 B. C. from observations of the equinoctial colures recorded by Parásara—Wilford, 1367 B. C. from independent observations—Wilson, 1430 B. C. The mean of these is 1395 B. C. The date of 1180 B. C., which Jas. Prinsep was inclined to adopt on account of its near coincidence with B. C. 1176, the epoch of Paras-sur-ama whose era is still in use, was the *first* calculation of Davis and Colebrooke. Their *corrected* calculation was the earlier date which I have given.

names. Thus Chandra-Gupta had a birth name, which is not mentioned; a local name, *Palibothres*, or lord of *Palibothra*, and a royal name, *Sandrakottos*, which he assumed on his accession to the throne.\*

The Greek name of *Σαυβαγασνης* is most probably the Sanskrit *साम्बागसेन*, *Saubhāgasena*, or chief of the fortunate army, that is, the victorious leader. *Yavanadhara* means the "keeper of Greeks," or the retainer of Greek troops; and *Durandhara* means the "possessor of good qualities" or the "possessor of wealth." Both of these are royal titles which may be compared with those of the Arsacidæ of the same period, Philhellenos and Evergetes. *Saubhāgasena* and *Yavanadhara* may be considered as varieties of the same title as the leader of a body of Greeks would of course have been the chief of a fortunate or victorious army. The name of *Dhudson*, which is given by Tod, appears to me to be the common colloquial corruption of *Dhursen*, the chief of a good army, which may also be considered as synonymous with *Saubhāgasena*.

Now it is curious that all these names refer to the military character of the chief, which is also ascribed to the founder of the *Mayūra* dynasty in the *Rājāvali*. Ward calls him simply the minister, but both Tod's list and mine more correctly state him to have been the "military minister" of his predecessor. Ferishta mentions that he was the nephew, خواهر زاده, *Khudhtr-zāda*, the "sister's son" of *Fūr*, the antagonist of Alexander: but I suspect that he may have mistaken the family name of مور *mūr* (Mora, Maurya or Mayura) for فور *Fūr*. This seems to be the more probable as my list mentions that the throne which he obtained had formerly belonged to his ancestors. It is possible therefore, that *Durandhara*, the "possessor of wealth," or of "good qualities," may be the same as the prince *Sampadī* the "increase of wealth," or of good qualities, who was the son of *Kunāla*, and the grandson of *Asoka Maurya*.†

There is one other fact about *Jona* which must not be omitted. According to Ferishta, he is said to have been a liberal prince, who

\* Megasthenes in Strabon, XV. Similarly we have Omphis and Taxiles; the former being most likely the real name, the latter certainly the local one, as lord of Taxila.

† Burnouf-Bhuddisme Indien, p. 430.

patronised the arts and founded many cities on the Ganges and Jumna.

Of his immediate successors, *Senadhwa*ja and *Mahāganga*, I have nothing to say; but the fourth prince *Mahāyodha* or *Mahi-jodh*, whose name is unfortunately missing in Tod's list, is most probably the same as the *Mahigul* of the coins. The sixth prince *Jivana*, or *Jivansirāj*, is, I have little doubt, the *Jivanisa*, or *Ζεωνισος*, of the coins; and the last prince *Rājapāla* is, I think almost certainly, the same as the *Rāja-bāla*, or *Ραζω βαλος* of the coins. In Ward's account it is stated that *Rāja-pāla* having given himself up "to effeminate amusements, his country was invaded by *Sākāditya* king of Kumaon who proved victorious and ascended the throne."\* In my list it is added that *Sākāditya* was invited by *Rājapāla*'s minister. Tod has made a jumble of this simple statement by confounding *Sākāditya* the "chief of the Sākas," with *Vikramāditya*, the *Sākūri* or "foe of the Sākas."

In all these accounts the successful conqueror of Delhi is called lord of the mountains of Kumaon. Even in Ferishta we find *Fūr*, the antagonist of Alexander, styled "king of Kumaon." The Sanskrit name is *Kūrmāvan*, or *Kūrmāchal*, which is a synonyme of *Himāchal*; but as *Kūrma* is the same as *Kachchhapa*, कच्छप, a tortoise, we may identify *Kūrmachūl* with *Kachchhāchal*, and the kingdom of Kumaon with that of *Khache* or Kashmir which in the time of the Indo-Scythians, or Sākas certainly comprised all the mountains of the Panjab then inhabited by *Khasas*. In proof of this, I need only mention that the Mongol author Sanangsetsen calls Kanishka the king of Gache; and that in an inscription, still existing in the Indreswari temple at Kangra, mention is made of the *Gachchhē-rāj* or kingdom of Gaché.† These facts are, I think, sufficient to prove that *Sākāditya* was not the petty chief of the Kumaon hills, but the great king of the Indo-Scythians as his

\* Ward's Hindus, I. 24.

† It is possible however, that *Gache* or *Gachu* was only the name of Kanishka's original kingdom of *Kie-chi* between Balkh and Bamian. The name is still preserved in *Ghazniak* (the *Ghaznik* of Taimur) near the old fort and caves of Semengán, or Haibak as it is now called. The great Scythian may still have retained the title of king of *Gache* after all his conquests.

name imports; and whom we know to have been in possession of the Panjab at this very period.

I will now describe the coins and inscriptions which I have collected together in the accompanying Plate. They are of the highest interest and value for the elucidation of Indian history just before the Christian era; as they afford a sure guide to the religious and political state of India at that particular period.

*Coins of JIVANISA.*

*Fig. 1*—Round silver didrachma, unique. Jas. Prinsep. Journal As. Soc. vol. V. Pl. XXXV., fig. 5. R. Rochette. Journal des Savants 1839, p. 102—Prof. Wilson, *Ariana Antiqua* Pl. VIII. fig. 17—p. 312.

*Obverse.* The king on horseback. In front the Buddhist Monogram of Dharma. Greek legend, only partially legible.

*Reverse.* The king, clad in the Indian *dhoti*, standing to the front. On each side of the king is a Victory engaged in crowning him with her right hand. Ariano Pali legend incomplete: *Mahigu (la Cha) trapasa Jivonisasa*. This coin, which was in General Court's collection was assigned doubtfully to Mauag by R. Rochette, who thought that he could trace the words ΜΕΤΑΛΛΟΥ ΜΑΥΟΥ: but he admitted that the correctness of this reading would depend on the decipherment of the native legend. From Jas. Prinsep's etching, which was copied from General Court's sketch, I was inclined to assign this coin to Artemidorus, of whom I obtained a coin in 1848. But its true attribution has been finally settled by the following coin which bears exactly the same legends in a much more perfect state.

*Fig. 2.* Round silver Hemidrachma, unique. E. C. Bailey, Esq. Panjab, 35 grains.

*Obverse.* The Raja on horseback: the Buddhist monogram of Dharma in front. Greek legend in corrupt characters.

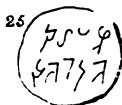
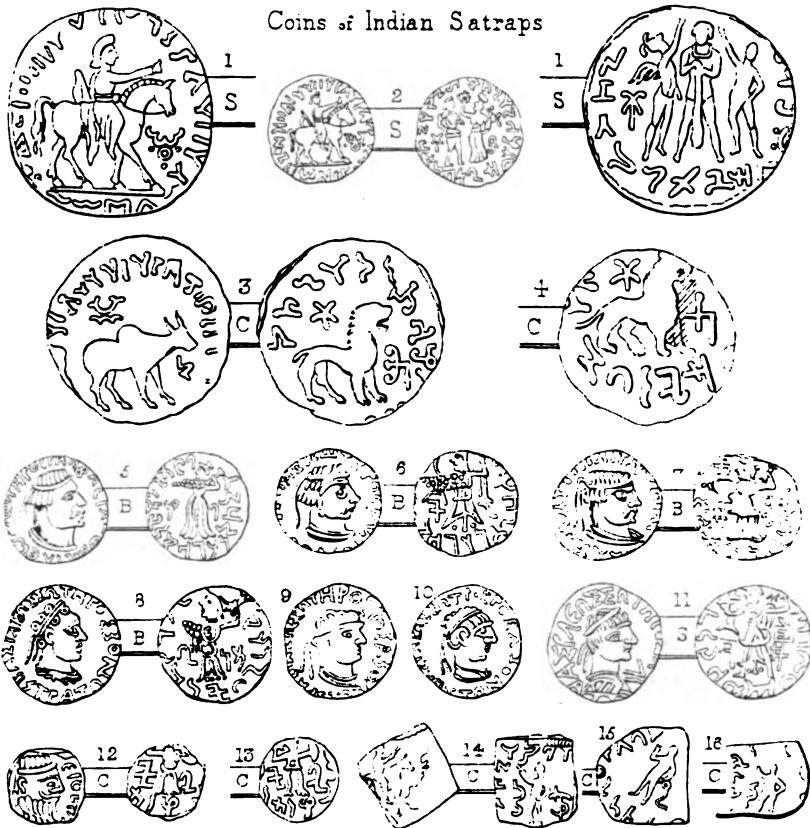
ΟΝΝΗΛΙΥ ΥΗΥΣΑΤΡΑΠΗ . ΖΕΙΩΝΙΣΟΥ

or, ΟΠΥΔΟΥ ΥΙΟΥ ΣΑΤΡΑΠΗ or ΖΕΙΩΝΙΣΟΥ.

(Coin) of Mahigul's son, the Satrap Zeiónisos.\*

\* I consider this name to be the same as the Greek Διογενος, as both terms are simple renderings of *Jivanisa*, the "lord of life." In India this was a title of the procreative Mahadeva. In this form of the reproducer, the youthful Ιαχως was

Coins of Indian Satraps



18

17

19

20 Aswa Varma

21 } Aswa-pati

21 Indian  
Sugar Mill

22

20



30

Sasan

22 Saur

24 Manikyaia Ventura

25 Manikyaia Court

27 Kozola Kadaphes

28 Kozoulo Kadachizou





*Reverse.* Demeter, or the Indian *Ardokhro*, with a cornucopia in her left hand, and a wreath in her right, with which she is crowning the Rāja who is standing before her. Ariano-Pali legend "*Mahigulasa Chatrapasa-putrasa Chatrapasa Jivanisa*" (coin) of the Satrap MAHIGUL's son, the Satrap JIVANISA.

*Fig. 3.* Round copper coin weighing 167 grains, procured at Kashmir.

*Fig. 4.* Ditto round copper coin similar to the last, procured at Rawal Pindi.

Both of these coins are in my own possession; and I am not aware of the existence of any other specimens. No. 4 has the name perfect which is wanting on No. 3.

*Obverse.* Humped Indian Bull: Buddhist monogram of Dharma; corrupted Greek legend as on Nos. 1 and 2.

*Reverse.* The *Singha*, or maneless Indian lion. Ariano-Pali legend as on Nos. 1 and 2.

The types of the horseman on the silver coins, and of the bull and lion on the copper coins, all show that *Jivanisa* cannot be dated earlier than the reign of Azas, from whose coins they are evidently copied. Prof. Lassen assigns the reign of Azas to B. C. 116-90 and my own chronology to B. C. 110-90, both of which periods correspond with the approximate date of *Jivana* given with my table a few pages back. The prominence of the monogram of Dharma on all his coins proves that *Jivana* was a Buddhist and his imitation of the types of Azas indicates that he was most probably the satrap or tributary of that prince.

#### Coins of RĀJABĀLA.

*Fig. 5.*—Round billon hemidrachma, weighing 37 grains; one of three in my own possession.

the same as the phallic Hermes, and the four-faced Indian Brahma. In fact the supreme Mahadeva in his threefold form of Brahma, Vishnu, and Siva, is the same god as Dionysos the Demiurgus. Schlegel and Keightley have denied the Indian origin of Dionysos; but in my opinion there is nothing more certain; and I hope hereafter to be able to establish my opinion. At present I will content myself with referring to the gem bearing the words NAMA SEBESION which is pure Sanskrit signifying "glory to *Sebazios*," a well known title of Dionysos. See also Ausonius—Epiqr. xxx. "Dionysos Indi existimant."

*Obverse.* Diademed bust of the king in bold but rude style. Greek legend in late characters, incomplete on all.

BACIAEI BACIAECC CETHPOC PAZ

which may be corrected and completed thus:

ΒΑΣΙΑΕΩΣ ΒΑΣΙΑΕΩΝ ΣΩΤΗΡΟΣ ΠΑΖιοβαλον.

*Reverse.* Rude figure of Minerva Promachos. In the field two letters forming *Aga*. Ariano Pali legend quite perfect.

*Chatrapasa apratihatachakrasa Rājābhlāsa.*

“(Coin) of the Satrap ΒΑΓΑΒΑΛΑ, invincible with the discus.”\*

*Fig. 6.* One of four billon hemidrachmas in my own possession, weighing 36 grains. These specimens differ from fig. 5 chiefly in being of ruder execution: but one of them has the Greek name extended to ΠΑΖΙΟΒΑ; and all of them have the native title shortened to *Apratichakrasa*, which has exactly the same meaning as the other. In the field of the reverse are the letters *Hasti* which I refer to Hastinapura, the old lunar capital on the Ganges.

*Fig. 7.*—This is one of several billon specimens in my own possession, weighing 36 grains. The head is of still ruder workmanship and is quite flat at top. The native legend and monogram are the same; but the Greek legend differs entirely. From a comparison of eleven specimens it appears to be

ΑΣΙΑ or ΣΥΙΑ ΠΟΗΣ ΙΥΠΟ ΠΙΣΙΟ ΣΤΡΑΤΙΥΣ

from which I make out conjecturally,

ΒΑΣΙΑΕΩΣ ΣΩΤΗΡΟΣ ΠΙΣΙΟβαλον ΣΤΡΑΤΩΝΟΣ.

This connection of the names of the Hindu princes Rājābhl, “the invincible with the discus,” and of the Greek king Strato, might justly have been disputed if these corrupt legends had been the

\* In Hindu mythology the discus, or quoit, is the favorite weapon of Vishnu; but it is now used only by the *Akālīs*, or Sikh fanatics of the Punjab. Philostratus, *Life of Apollonius*, c. 27, relates that the king of Taxila in A. D. 45, “sometimes exercised himself with the *disc* and Javelin, after the Greek fashion.” In ancient times it would seem to have been in common use amongst the Greeks, as Homer relates that while Achilles sulked in his tent,

On ocean’s shore his soldiers hurled the quoit,  
Or twanged the bow, or sped the quivering lance.

——— λαοὶ δὲ παρὰ βηγγμῖνι θαλάσσης

δίσκοισιν τέρποντο καὶ αἰγανέσιν ἰόντες,

τόξοισιν ὁ.

*Iliad*. II. 773.

only evidences of it. But I possess some very rude coins of Strato, which were found in company with the others and which were evidently the prototypes of these coins of Rájábála. Three of these pieces are engraved in the accompanying plate. They were found along with the coins of Rájábál in a ruined mound at Mathura. Their weight ranges from 36 to 37 grains.

*Fig. 8.* Shows the decline of Greek art, but the legends are still perfect. The Greek legend is ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΣΤΡΑΤΩΝΟΣ. The native legend is *Māhardjasa trādatasa Stratasa*, which is a literal translation of the Greek. The other coins are still ruder, and their Greek legends have become corrupt, although their native legends remain perfect.

*Fig. 9.* ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΡΟΣΑ ΣΤΩΝΟΣ.

*Fig. 10.* ΒΑΣΙΛΕΩΣ ΣΩΤΡΟΣ ΡΟΣΑ ΣΤΩΝΟΣ.

As the native legends of these coins preserve the names and titles of Strato quite perfect, I can only conclude that the latter half of the Greek legend has been jumbled by the engraver of the die, and that the word ΡΟΣΑ has been formed by repeating the last three letters of ΣΩΤΗΡΟΣ, to fill up the blank left by the omission of the three letters, ΤΡΑ, of the name. If this conjecture is admitted the corrupted Greek legend of Rájábála's own coin, *Figs. 7*, may perhaps be explained in the same way.

I do not think that the issue of these rude coins can be attributed to Strato himself; but rather to the native princes who afterwards succeeded to his power. The gradual decline of the style of workmanship, and the corruptness of the Greek legends shewn in *Figs. 8, 9, 10*, make this conjecture the more probable. It is still further strengthened by the known facts of the want of a silver coinage amongst Indo-Scythians, and of the consequent currency of the drachmas of Menander and Apollodotus even to so late a period as the second century of the Christian era.\*

\* The following instances of the continuance of a sovereign's coinage long after his death may be worthy of notice. Feroz Toghlaq died in A. H. 790; yet we possess coins bearing his name dated up to A. H. 828. Husen Shah Sherki, of Jaunpore, was dethroned in A. H. 883, and died in 905, yet his coins may be obtained in a perfect series up to 918. Lastly Shah Alam of Delhi died in 1806; but the issue of coinage was continued in his name by the East India Company,

Another Greek prince whose coinage was re-issued and perhaps imitated by the native chiefs in their own names was Zoilus. *Fig. 11*, is a rude silver hemidrachma of this king, which was obtained in the Punjab. It is of the same type and of the same barbarous style as the coins of Strato and Rájabála, and it bears the same Ariano Pali mint-mark of two letters forming *Hasti*, which we find on the commonest coins of Rájabála.

Besides the coins which I have already described I possess five copper specimens bearing the name of Rájabála. They are of the same size, type, and style as the billon coins, and appear to me to have the traces of silver plating upon them. I do not therefore, consider them as a true copper coinage but as the base silver currency of the Punjab portion of Rájabál's dominions, in which they are now found. They bear different mint-marks from the billon coins but the legends are the same, with exception of the title which exalts the chief to a *Maháchatrapa* or "great satrap."

I have already identified the satrap Rájabála with Rájapála the last of the Mayúra kings of Delhi, who was conquered by Sákáditya, the chief of the Sákas or Indo-Scythians, who was himself overcome by Vikramáditya in 57 B. C. That this is the true date of these coins is rendered almost certain by the discovery of similar coins of a still ruder style, and therefore of a later period, which bear the name of Gondophares. Two of these coins are engraved as *Figs. 12 and 13*. The Greek legend is corrupt, and I cannot decipher more than the word BACIAIC but the Ariano Pali legend, which is not perfect on any one specimen, may easily be completed by a comparison of them all. It is the same as the simple legend which is found on the larger coins of this prince, *Máharájasa trádātasa Gondopharasa*. I have found most of these coins in the Punjab as far south as Multan, but a few specimens were procured to the eastward of the Sutlej.

The Satraps whose coins have already been described have been identified with the Hindu Princes of Delhi on the joint evidence of their similarity of names, of their contemporaneous sovereignty,

for nearly thirty years; and this coinage is still generally current after a lapse of forty-eight years.

and of the places of discovery of their coins being within the probable limits of the ancient kingdom of Delhi. The satrap coins and inscriptions, which yet remain to be described, have been found only in the western Punjab, excepting a few rare specimens from Jelalabad and Peshawur. The metropolis of this western Satrapy I would fix at Taxila, near Manikyála, where two inscriptions have been found which contain the names of three different satraps. Delhi and Taxila may therefore be considered as the eastern and western satrapies of the Indian portion of the great empire of the Indo-Scythians. Between these extreme points lay the satrapy or principality of *Cheka*, the ancient *Sákala*, which stretched from the *Pi-po-she* (the Vipása or Bynas) on the east, to the *Sin-thu* (the Sindhu or Indus) on the west, and from the foot of the Rajaori hills to the confluence of the Punjab rivers.\* The Buddhists have celebrated the conversion of Milindu Rája of Sákala by their great teacher Nágárjuna, shortly after the commencement of the Christian era. Another king of She-ko-lo or Sákala is mentioned by Hwan Thsang as having reigned several hundred years before his time. This king he calls *Ma-yi-lo-kiu-lo*, who may possibly be the same as the *Mahigula* of our coins. Hwan Thsang travelled in India from A. D. 629 to 645. If therefore to 640 we add 150 B. C., the approximate date of Mahigula, we obtain 790 years as a fair measure of the vague statement of the Chinese traveller.

The Chinese name is spelt *Mo-hi-lo-kiu-lo* by Stanislas Julien,† who renders it most correctly by the Sankrit *Mahirakula*. This may indeed be the true name on the coins, for the first two syllables of the name are found only on Mr. Bayley's specimen, and I read them at first as Mani. But we are not yet sufficiently conversant with the compounds of the Ariano Pali alphabet to pronounce positively that the letter *r* when preceding a consonant was omitted.

\* The northern boundary of Cheka was only two days' journey from Rájaori, that is the foot of the Punjab hills. While to the south Cheka possessed the dependency of *Meu-lo-sau-pu-lo*, or Multan. It therefore comprised all the plains of the Punjab, while the hilly districts were subject to Cashmere. The *Cheka* of A. D. 650 had in fact the same limits as the kingdom of Lahore in A. D. 1050.

† See *Histoire de la vie de Hiouen Thsang*, p. 459; and also *Fo-kwe-ki*, Appendix, p. 381.

In the words *dharma* and *varma*, as I will presently show, it was certainly used occasionally, although the former word is more frequently found in its Pali form of *Dhama*. But notwithstanding this uncertainty, I think there is a sufficient similarity in the names, and a sufficient approximation in the dates and countries of *Mahirakula* and *Mahigula*, to warrant a strong probability of their identity.

In describing the coins of the eastern satraps Jivanisa and Rájábála, we have had the valuable, although perhaps not quite authentic, aid of a few historical notices of the dynasty to which they belonged. But in describing the coins and inscriptions of the western satraps of Taxila, we must trust entirely to our own sagacity in making deductions more or less probable from the few ascertained facts. The fact that Taxila was tributary and not independent, is not solely derived from the coins, but is positively affirmed by Hwan Thsang, who states that in his time the royal race had become extinct, and that the country was then subject to the kingdom of Kashmir, although it had formerly been a dependency of the kingdom of Kapisa,\* that is of the Turki empire of Kabul. The coins belong to three different princes and are of different sizes and different types, but they are such evident copies of the commoner types of Azas, that there can be no hesitation in assigning them to the close of his long reign, that is to about B. C. 100 or a little later. One of these three princes, named *Aswavarma*, was certainly a tributary of the great Scythian prince, as we find the name of Azas, the "great king of kings," always occupying the Greek side of his coins. I will now describe the few specimens of the coinage of these western satraps, which have come to my notice.

*Figs. 14, 15, 16.* Small square copper coins, weighing 38 grains. The first is in my own possession; the second is from my unpublished plates of Bactrian coins, and the third is from Jas. Prinsep's Journal. These, with a fourth specimen, were all procured in the Punjab.

*Obverse.* Horseman copied from the coins of Azas: Greek legend, illegible.

*Reverse.* Male figure with right hand raised towards his head. The Ariano Pali legend is not complete on any of the specimens,

\* Stan. Julien, *Histoire de la vie de Hiouen Thsang*, p. 449.

but the title of *chatrapasa* is distinct on all of them. From its position in the middle of the legend, I conclude that the inscription begins with the name of the satrap's father on the right, and ends with his own name immediately beneath the standing figure. On fig. 15, the name reads invertedly *Mahava*, perhaps *Mahavarma*, but other and better preserved specimens must be obtained before we can decide upon the actual name of the satrap.

*Figs. 17, 18, 19.* Square copper coin of middle size—Ariana Antiqua, Pl. VIII. fig. 2, p. 331: from a coin belonging to Dr. Swiney. One specimen in Lady Sale's collection; three specimens in Mr. Bayley's cabinet, and one stolen from me in 1844. Of all these six specimens, I have sketches now before me.

*Obverse.* Horseman as on the coins of Azas. Greek legend. corrupt and incomplete on all the specimens.

Dr. Swiney,.....YOH...PA.....EICAT.

Lady Sale, PTAYOT .....

Mr. Bayley, PAYOIY-ATAHC-EIC.....

Author,..... XAPATILIA .....

Mr. Bayley, .....PIAII.....

*Reverse.* Maneless Indian Lion; Ariano Pali legend doubtful beginning on all the specimens with *trapasa*, which may be satisfactorily completed to *chatrapasa* by prefixing a single letter. The whole may perhaps be read as follows:

(*cha*) *trapasa Bhrahata Opha—aspasa putrasa.*

“(Coin) of the satrap Phrahates the son of ———.”

On comparing the Greek fragments with the Ariano Pali legend the Greek name may be read conjecturally as ΦΠΑΤΑΗΕ, or ΦΑΡΑΤΑΗΕ, which would only be a variety of the well known name of Phraotes. Now, if we could believe the somewhat apocryphal travels of Philostratus, this was actually the name of two princes of Taxila, of whom the younger one was twenty-seven years old\* in the reign of the Parthian Bardanes, 44 to 47 A. D. But as the first Phraotes was the grandfather† of the other one, the date of the elder prince may be placed as high as 50 or even 60 B. C. This date is so

\* Philostr. Apollon. II. 27.

† Ibid.—II. 31 —“My grandfather was a king, of the same name as myself. Phraotes.”



near that which may be assigned on numismatic evidence to the coins; viz. B. C. 90 to 60, that I should have no hesitation in identifying the elder Phraotes of Philostratus with the Brahata of the coins, if I felt as certain of the correctness of my readings, and as sure of the authenticity of the Greek sophist's travels. But until some better preserved specimens of these rare coins shall be found, we must perhaps rest satisfied with the conjectural reading which I have given. I will only add another guess that the name of the satrap's father which certainly appears to begin with the two letters *O* and *ph* may perhaps be *Omphis* which we know to have been the name of the king of Taxila at the time of Alexander's invasion of India.\*

*Fig. 20.* Round copper coin of middle size, weighing 156 grains. Common in Hazára and the Rawul Pindi district.

*Obverse.* Horseman. Greek legend in tolerably good characters, ΒΑΣΙΛΕΩΣ ΒΑΣΙΛΕΩΝ ΜΕΤΑΛΛΟΥ ΑΖΟΥ.

"(Coin) of the king of kings, the great Azas."

Monogram before the horse formed of the two native letters *a* and *gam*.

*Reverse.* Minerva Promachos to the right. In the field a Greek monogram forming the syllable MIP, or MITP, and the Buddhist monogram of Dharma surmounted by a star or sun, the symbol of Buddha. Ariano Pali legend in bold and well formed characters.

*Indravarma-putrasa Aspavarmasa stratégasa jayantasa.*

"(Coin) of INDRAVARMA'S SON, ASWAVARMA the victorious general."†

These coins are amongst the most important of the long and interesting series of Indo-Grecian numismatics. The sovereign in whose reign, they were issued, is the great Scythian Azas: but the coins themselves were actually struck by a Hindu general, who, by his use of the monogram of Dharma, declares that he was a Buddhist, and by his assumption of the Greek title of *Stratégasa*,

\* Ktesiss (Persica-Fragm.) has a similar name amongst the Persians, which he writes 'Ορέφας.

† My authority for assigning the value of *rm* to the compound letter which occurs in both of these names, will be fully stated when I come to speak of the coins of Kozala Kadaphes.

*Στρατῆγος*, shows that he commanded a body of troops amongst whom some traces of Greek discipline still remained. Whether the victorious Hindu general was a mere soldier of fortune, or a tributary chief who furnished a stated quota of troops, and who had led his own clan to victory, can only be conjectured. But the prominent fact of his issue of coinage which in the east has always been one of the most highly-cherished prerogatives of a king, speaks strongly in favour of the royalty of Aswavarma. It is possible that he may have considered the foreign title of *Stratégos* as a higher distinction than his native rank of *Rāja*, or satrap; or he may have waived the publication of his royal title out of deference, or in obedience, to his paramount sovereign Azas, the great king of kings.

The title of Strategos proves also that the Bactrian Greeks had introduced into India their own military grades, as well as their discipline, in the same manner as the British have since done. The extent of the Greek dominion and influence in the Punjab are only now beginning to be understood. In my account of the temples of Kashmir, I have stated my opinion that their pillars and ovolo mouldings owed their origin to the influence of Grecian art. Since then, Dr. Stevenson\* has made known three different inscriptions from the western caves, which record the name of a Greek architect, The name is variously written as *Dhanukakata*, *Thenukakata*, *Dhanukakadha* which Dr. Wilson supposed to represent the Greek *Θεονικος*. Dr. Stevenson prefers *Ξενοκρατης*; but I think that the native transcript would be more fairly represented by *Δεινοκρατης*, which was besides the name of the celebrated architect of Alexander the Great.

*Figs. 21 and 22.*—Round copper coins of middle size, generally attributed to Azas. They are always of very rude style, and specimens with even a few legible characters are extremely rare. See

\* Journal, Bombay Branch Royal Asiatic Society, Vol. V. p. 157. There are numerous verbal emendations which I think might be made in Dr. Stevenson's translations;—but I will only at present draw his attention to the opening of No. 5 inscription from Junir, which he reads *Isi mala sáminobhaya*. Now the first letter, which he takes for a peculiar form of the Swastika, is undoubtedly *Gri*, and the second, which he makes an initial *i*, is the figure 3, the opening being *Gri*: 3 or "three houses," to which I presume the inscription refers.

Ariana Antiqua Pl. VII. fig. 11, and Jas. Prinsep's Journal, Vol. IV. Pl. XXII. figs. 6, 7 and 8. The two legends in the accompanying plate are from specimens in my own cabinet. Fig. 21, is a small coin weighing 64 grains; but it is the best executed specimen that I have seen of this type. Fig. 22, is a middle-sized coin, much corroded, but with the legend in better preservation than usual: weight 166 grains.

*Obverse.* A humped bull. Greek legend, usually incomplete and illegible. On fig. 21, however, it begins with BACI, and ends with AΘOY, or AMOY.

*Reverse.* A two humped Bactrian camel. Ariano Pali legend, always imperfect; but on fig. 22, the following portion of the inscription is in fine preservation. Maharajasa A—

By a comparison of the two legends, they may be completed respectively as follows:

BACIΛωs ασκα βαΘOY (or AMOY.)

*Maharajasa Aswapaté (or Varmasa.)*

“(Coin) of king Aswapati (or Aswavarma).”

The style of these coins is unusually rude, and the legends are always corrupt and defective. It is barely possible that they may belong to Aswavarma, the victorious; but as his coins, though executed in a stiff hard style, are generally in good preservation and very nearly complete in their legends, other specimens of these camel coins are much required for comparison, before we can venture to attribute them satisfactorily.

*Fig. 23,* is the inscription on a copper seal procured in the Punjab by Mr. Bayley. As the letters are reversed, this seal most probably belonged to one of these Indian satraps, who must have used it for stamping and authenticating his public documents. The Ariano Pali legend, has not been satisfactorily made out, but it appears to be

*Sivasena chatrapa Atri naram Pathanavaré.*

“(Sealed) by Sivasena, of the race of Atri, Satrap of Pothowar?”

The satrap's name may perhaps be *Sivapa*, as the opening letters may also be read *Sivapena*, instead of Sivasena. *Atrinaram* may be intended for “a man of the race of Atri,” although such a form of expression is certainly unusual. *Pathanawóré*, I think, may more

probably be considered as the original form of the present Pothowar, which is a part of the Rawal Pindi district. There is every probability however, in favour of the satrap's descent from Atri; for the salt range is still called *Jádon-ka-dáng*, or hills of the *Yádavas*, who were one of the two celebrated branches of Atri's descendants. Perhaps if we could obtain a complete list of the *Jádon Bhátis*,\* now settled in Jesalmer, we might find traces of Taxiles-Omphis, and of other chiefs, whose names are only found on coins and inscriptions. My list is much longer than Tod's, but is still very incomplete. A complete list may yet be procurable, for I possess one of the *Jádon* of Khiraoli, which extends to one hundred and twenty-eight names, from Krishna to the present Rájá.

*Fig. 24*, is the inscription on the lid of the brass cylinder extracted by General Ventura from the great Manikyala tope, which I believe no one but myself has yet attempted to decipher. One of the names is still doubtful, but the remainder of the inscription seems to me to be perfectly clear. I read the whole inscription as follows:

*Swati Siva Chatrapasa Gandaphuka Chatrapa putrasa danatrayam.*

"The three gifts of the Satrap Swasti Siva, son of the Satrap Gandaphuka."

The last four letters of the inscription which, for want of room on the lid of the cylinder, are placed below, I read as *danatrayam*, "the three gifts." These, I suppose to refer to the three cylinders or relic boxes, which were deposited in the three separate chambers of the tope. The three deposits comprised the following articles.

Upper deposit at 12 feet from top. Iron (or copper) box enclosing a box of pure gold which amongst other things contained the following coins.

Gold coin of Oerki. *Reverse*. A four-armed seated figure with a crescent behind the shoulders styled MANAO-BAFO. This figure I take to be the four-armed OKPO, the Supreme God, or *Mahádeva*, who, like Jupiter Osiris, is frequently represented with the lunar crescent. *Vagisa* was a name of Vrihaspati or Jupiter in India, as

\* The people very simply and neatly distinguish between the Hindus and Musalmans of the same caste by varying the pronunciation. The Hindus are called *Bhátis* and *Játs*, the Musalmans, *Bhatís* and *Jats* (Bhuttees and Juts).

*Bayotavos* was in Persia.\* *Manao* is no doubt the moon, and is the same word as the Doric *Mava* and Anglo-Saxon *Mona*.

One thin Sassanian silver coin.

Two Indo-Sassanian silver coins.

One thick silver (or electrum) coin of rude execution, but of strong relief.† I possess two duplicates of this coin in mixed metal containing gold, silver, and copper. One was obtained within five miles of Manikyāla, and the other at Amritsar. The complete inscription is *Sri Yaso Varmma*, which was the name of the celebrated Rāja of Kanouj, the rival contemporary of Lalitāditya of Kashmir, who reigned from A. D. 693 to 729. I do not infer from this that the great tope was not built until A. D. 700, but simply that the uppermost chamber, with its enshrined relic, was accessible until that date. In most topes the relic chambers were made accessible with the view of extracting the relic boxes for annual exhibition to the people. Kings and conquerors could of course command a sight of them at any time. I suppose therefore, that on his invasion of the Punjab Yasovarma may have inspected the relics of the great Manikyāla tope, and that his coin may have been deposited in the relic box by the grateful Buddhist fraternity as a remembrance of his visit.

The *second deposit*, at a depth of 45 feet, consisted of a copper box enclosing a cylinder of pure gold. Nothing was found in this casket, but it is probable that there was an enshrined relic which was not observed on account of its minuteness.‡

The *third deposit*, at a depth of 64 feet, consisted of another copper box, enclosing a brass cylindrical box "cast and turned on

\* Both Diodorus, l. II. 13, and Steph. Byz. mention the "*Opes Bayotavos*." The name of the god who was worshipped there must have been *Bagis*, for Diodorus states *Τό δὲ Βαγιοταβος "οπος" ἐστὶ μὲν ἱερὸν Διός*. Hence *Bayotavos* is the Sanskrit *Vagisa-sthāna* or *Vagisthāna*, the temple or place of Jupiter. As the common language in the times of the Achemenidæ appears to have been almost pure Sanskrit *Bagistān* is a preferable reading to Belhistan, which Col. Rawlinson has adopted.

† Journ. As. Soc. of Bengal, Vol. III. p. 137.

‡ In one of the Bhilsa topes, the precious relic, enshrined in a crystal casket, was a piece of bone not larger than a common pea.

the lathe," inside which was another gold cylinder. With these caskets were found forty-nine copper coins and one gold coin, all belonging to the two Indo-Scythian princes Oerke and Kanerki, or Hushka and Kanishka. In the gold cylinder, there was a small piece of silver, about the size of a shilling, on which were engraved two lines of Ariano Pali writing: see fig. 25. The upper line may be read without hesitation as *Gomangasa* "of the emancipated," or more literally of "one who has abandoned the body;" from *guna*, abandoning, and *angga* the body. The second line I read as *Kanarakasa*, taking the first and fourth letters as cursive forms of *k*. No doubt this plain disc of silver, as Jas. Prinsep supposed, was "intended to explain the whole mystery." This mystery, I believe to be explained by my reading of the two words as *Gomangasa Kanarakasa*, or "(relics) of the emancipated Kanerki." According to this reading, the great tope of Manikyala was the Mausoleum of the Indo-Scythian Kanerki or Kanishka, the paramount ruler of Kabul, Kashmir, and the Punjab, about the beginning of the Christian era. The brown liquid therefore, most probably contained the mortal remains of the great Indo-Scythian emperor, mixed with a portion of sandal wood or other ashes from his funeral pile.

With regard to the three gifts of Swasti Siva, the satrap of Taxila, I suppose that they may have been either the three distinct deposits which were found in different parts of the tope, or the three separate boxes of the lower deposit only. The former, I think, is the more probable conclusion, as the uppermost deposit contained a gold coin of Oerke, who was an Indo-Scythian prince of as early a date as Kanishka himself.

I formerly thought that *Gomangasa*, "of the abandoned body" had reference to the tope which was built over the spot where Buddha had "abandoned his body" to feed seven hungry tiger-cubs. But the publication of Hwan Thsang's life by M. Stan. Julien, which gives much more detailed accounts of the Buddhist monuments of India, shows that the "tope of the abandoned body" was not at Taxila itself. In this part of Hwan Thsang's text there appear to me at least two mistakes. These are, 1st, his placing the *Sin-thu*, or Indus, to the north of Taxila; and, 2nd, his placing *U-la-shi*, or Urasa (the Varsa Regio of Ptolemy and the Rash district of the

present day) to the *south-east* of the northern frontier of Taxila. The pilgrim had already visited the districts on the western bank of the Indus, and was now on his way from Taxila to Cashmere. For *Sin-thu* I would read the *Sohan* or *Swan* river, the *Soamus* of Arrian, beyond which the pilgrim arrived at a great gate of stone,\* from which at a distance of 20 *li* to the south-east was situated the tope of the abandoned body. The high road from Taxila (or Manikyála), after crossing the Swan river, leads through the narrow pass of *Múrgala*, or snake's neck, to Hasan Abdal. This rocky pass I take to be the "great stone gate" of Hwan Tshang, and the tope of Belar, near Osman Khátir, which is only about four or five miles distant, I take to be the "tope of the abandoned body." From this point, the district of *U-la-shi* bears north-east and not south-east.

I take this opportunity of again stating my firm conviction that Manikyála is the ancient Taxila. I do this because it has been stated in this Journal on several occasions, that I consider *Trakpari* to be the true site of Taxila.† On the contrary I have *always*

\* Stan. Julien, p. 89—"une grande porte en pierre." *Pass* is perhaps the true reading instead of gate; for the two words are the same in different languages: thus the Sanskrit *dwára*, a door, is the Afghan *darrá*, a pass, a narrow valley, and the Indian *ghát*, a pass, is the same word as the English gate. Dr. Atkinson refers the name of *Már-gala* to a great battle; but the parallel names of *Ghora-gali*, "or horse's neck," and *Gidar-gali* or "jackal's neck," applied to passes in the same country, proves the correctness of my version.

† I allude more particularly to Major Jas. Abbott's article on the battle-field of Alexander and Porus which contains the above statement. Sir H. Elliot believed that such was my opinion, and others may have done the same. In 1839 my brother first informed me of the village *Takhála*, and in 1848 I saw the village myself, which is within musket-shot of the tope. I again repeat my belief that this village *preserves the name* of the ancient Takkasila. Some further arguments of Major Abbott's may be seen in this Journal for 1853, p. 573. He there states that "in the name Maunkyála (read Manikyála) we have no resemblance to that of Taxila." Granted: but Manikyála is only the name of a village in the neighbourhood of the tope, and not the name of the tope itself. We know that the name of Taxila is as old as Alexander, and that the establishment of the Buddhist religion in Taxila is most probably not older than the reign of Asoka. There would not therefore, be any connexion between the names of the tope and city. Major Abbott thinks that the remains around Manikyála are "the ruins of the monastery of *Mainkialan* described by Hwan Tshang." But there is a fatal objection to this identification in the fact, that this monastery was in the valley of the Swát river, to the west of the Indus. See Fo Kwe-ki. Appendice 379.

believed and maintained that Manikyala was the ancient Taxila. In proof of this I quote the following paragraph regarding *Ta-chashi-lo*, which I published in this Journal upwards of six years ago. "This is the Sanskrit *Tak-sha-shila*, and Pali *Takkasila*, the *Taxila* of the Greeks, as noticed by Lassen. *It is undoubtedly the present Manikyala*, which is surrounded by ruins. One of the neighbouring villages is still called *Takkāla*, a name of the same import as *Takkasila*, and most of the coins now procurable at Rawul Pindi, and in the neighbouring villages are brought from Manikyala."

*Fig. 26.* Part of the inscription extracted by General Court from a second tope at Manikyala. The portion which I have given is taken from the end of the 4th line. I have selected this part because it apparently contains the name of the elder of the two satraps of Taxila, who are mentioned in the other inscription. But the name is unfortunately doubtful, as the two copies which I possess of Genl. Court's inscription differ from each other, as well as from Genl. Ventura's inscription. I have ventured however, to read the name as Gandaphuka which I will retain for the present for want of a better or more probable reading.

The two inscriptions appear to me to contain the following important facts.

Genl. Court's inscription. "In the year 446 in the reign of Kanishka, Maharajah of the Gushang (tribe), the satrap Gandaphuka erected a tope (for what purpose I have not yet been able to decipher)." As a proof of his attachment to the Buddhist faith the inscription ends with the words, *Sacha-dhama-pidasa* "of the crown of the true *dharma*."

Genl. Ventura's inscription. "The Satrap Swasti Siva, son of the satrap Gandaphuka, made a gift of three relic caskets, for the purpose of enshrining the mortal remains "of the emancipated Kanerki or Kanishka."

The date of the former inscription I have read as 446 on the authority of a stone slab in my own possession which gives in regular order the nine numerals\* of as early a period as the Sah coins of

\* In 1852 I discovered that these numeral figures, from 5 to 9, were the initial letters of their *Pashtu* names written in *Ariano Pali*. Thus 5 is represented by *p* for *pinz*; 6 by *sp* for *spaj*; 7 by *a* for *avo*; 8 by *th* for *atha*, the *a* having



the satraps of Saurashtra. The date I would refer to the Buddhist era of the *Nirvāna* of Sakya Sinha, not as now established in 543 B. C. but as generally believed in by the early Buddhists for a period of several centuries. According to the Chinese Buddhists the Turki king Kanishka flourished 400 years after the *Nirvāna*, and the great Asoka was converted to Buddhism 218 years after the same event, or 182 years before the date of Kanishka's rule. Now as the date of Asoka's conversion was the year 259 B. C. the epoch of the *Nirvāna*, as generally accepted by the early Buddhists, must have been in B. C.  $259 + 218 = 477$  B. C. The difference between this date and B. C. 543 is 66 years, which is exactly the amount of difference between the Buddhist and Brāhmanical accounts of the length of sway of the nine Nandas. Taking this corrected date as our guide to the Buddhist chronology we obtain  $477 - 400 = 77$  B. C. for the accession of the three Turki kings Hushka, Jushka, and Kanishka; and as they are said by the Rāja Tarangini to have reigned sixty years, we obtain B. C. 17 for the close of their sway. Now as the date of Genl. Court's inscription,  $446 - 477 = 31$  B. C. falls between these two fixed points of the accession and close of Kanishka's reign, there would appear to be some probability in favour of the correctness of my reading of the numerical figures.\*

already been used for 7—and 9 by  $\pi$  for  $\pi a h$ . Even the 4 is a  $c h$ , but as the Pashtu word is *salor*, this form must have been derived from India. The first four figures are given in two distinct forms, the second set being the older; and the two forms show in the clearest manner how the straight horizontal strokes of Asoka's, and even of later days, gradually became the 1, 2, 3 of India, from whence they were transmitted through the Arabs to Europe. Dr. Stevenson, in Bombay Journal, Vol. V. p. 38, found "a striking resemblance between the character denoting a thousand, and the Bactrian S reversed," and after an examination of the rest he "thought it exceedingly probable that they were all derived from that source." This was in an article read on the 17th February, 1853. My own more complete discovery was made somewhat earlier, in the summer of 1852. Dr. Stevenson's discovery besides deals with the higher number of one thousand; mine with the units only. But our independent deductions are the more satisfactory as they were obtained from different sources.

\* As the *Harshakāl*, or era of Sri Harsha, as recorded by Al-Biruni is within twenty years of this epoch, it is possible that the figured date of this text 1288 may be a misreading for 128. The difference of exactly 400 years between the dates of Sri Harsha and of Vikramaditya is, to say the least, very suspicious.





But the date of General Court's tope may be fixed approximately by the age of the Roman coins which formed the silver portion of the deposit in the relic caskets. The dates of these coins, which range from B. C. 73 to 33, fix the latter date as the limit of antiquity which can be claimed for the tope; and as my date of B. C. 31 falls two years short of this, there is at least some probability in favour of its correctness. The age of the great tope, opened by General Ventura, may therefore be placed in B. C. 17 or a little later.

I am in possession of two other dated inscriptions of the Indo-Scythians which I brought from the Yusufzai country in 1848. The older of the two (No. 5 of the plate) is dated in the year 333, which being deducted from 477 gives 144 B. C. This is somewhat earlier than the date of 126 B. C. which is usually assigned to the actual overthrow of the Indo-Grecian power by the Indo-Scythians. The date is followed by the word *Chitrassa*, which I take to be the month of *Chaitra*. The other letters I cannot make out satisfactorily, excepting a few in the middle which I read as *miti* 44.

The other inscription (No. 4 of the plate) is dated in the year 390 or B. C. 87, at which time we know that the Indo-Scythians were in full possession of Kabul and the Punjab. The first line may be read, with only a little hesitation as to the name, as follows: *San 390, Srāvānasa māsa sudi prathamē Mahodayasa Gushangasa rāja.\*\*\**

The letters which I have read as *Mahodayasa* might perhaps be read as *Maharājasa*: but the fact of the *Gushang*\* dominion and the date will still remain unaltered. The date is thus recorded: "In the year 390, on the first day of the waning moon of the month of *Srāvāna*."

I will now say a few words regarding the religious belief of the Indo-Scythian princes, which has already been the subject of conflicting opinions amongst the learned. Professor Ritter believed that they were Buddhists, and that the topes of the Kabul valley

\* The *Gushang* of the inscriptions I identify with the *Khushang* and *Kushang* of the coins, and with the *Kien-shang* (waggoners or coaches) of the Chinese. And, as we find the Kanishka of the Rājah Tarangini become Kanerki on the coins, so do I believe that the *Kushang* or *Gushang* are represented by the Greek *KOPANO* of the coins, and the *χαρδαναος* of Ptolemy.

were erected during the period of their sway. Professor Lassen, on the contrary, *was*\* opposed to the Buddhist origin of the Kabul topes because the coins which are usually found in them bear Mithraic types.† But as both Roman and Sassanian coins are also found along with the relics, it is certain that the types of the coins can have no connexion with the religion of the founders; which must therefore, be sought for by a closer examination of the other objects. The most usual deposits in the Kabul topes were "caskets or vases of copper, brass, or steatite, in one of which was generally found a fragment or two of bone," which Masson believed to have been the "essential relics over which the monuments were raised."‡ In the larger vases were found burnt (decayed?) pearls, beads, rings, seals, and other trinkets with gems, coloured stones, pieces of crystal, fragments of mother-of-pearl, &c. Only in three instances did Masson find inscriptions "one scratched with a style around a steatite vase, extracted from a tope at Daruuta; another written in ink around an earthen vessel found in a tope at Hidda; and a third dotted on a brass vessel, within a tope at Kohwát."

The nature of the objects discovered by Masson in the Kabul topes is, in my opinion, quite sufficient to prove the Buddhistical belief of their founders. For the Buddhists alone, of all the people of India with whom we are acquainted, were in the habit of depositing precious stones and metals with the relics of their holy teachers. Thus we find it recorded in the *Maháwánso*,§ that Dutthagámini, king of Ceylon, after placing the relic casket in its chamber, made an offering of all the royal ornaments then on his person. This description satisfactorily accounts for the presence of finger rings and other ornaments which Masson found in the topes of Hidda, and which Lieut. Maisey and myself found in the topes near Bhilsa. The usual practice, which is continued to the present day amongst the Buddhists of Ladák, was to deposit a set of seven

\* I say *was*, because I am ignorant whether he still holds the same opinion. I presume however, that his opinion has long since been changed.

† See note, p. 184, of the English translation of Lassen's *Points in the History of the Greek and Indo-Scythian kings in Bactria, Kabul and India*.

‡ *Ariana Antiqua*, pp. 59, 60.

§ *Maháwánso*, p. 190.

precious things, either of metals and gems, or of gems only. The simple fact of the discovery of these precious things in the topes of Cabul and India is, in my opinion, a sufficient proof of the Buddhist faith of the founders. But there is other evidence on this point still more conclusive and satisfactory to be found in the inscriptions which are engraved upon the relic boxes. I need not refer to those of the Bhilsa topes, which I have already published,\* and about which there can be no doubt, but to the three inscriptions which Masson obtained from the Kabul topes. The principal of these was engraved on a steatite vase extracted from No. 2 tope at Bimarán, on the plain of Darunta near Jelalabad.

This important inscription consists of two lines; the upper line, which is engraved on the lid, being only an abbreviation of the longer one on the body of the vase. Both of these inscriptions open with the words†

*Bhagavána Sariraki*

that is "(stupa) containing relics of BHAGWA'N," or Buddha. Now the word *Sarira* is the very term that was used by the ancient Buddhists to designate the relics or mortal remains of the founder of their religion, or of some of his principal followers. This peculiar word, under the form of *sha-li-le*, is still used by the Chinese Buddhists, and with the same signification. Lastly, it is correctly spelt with the palatal sibilant ण, and not with the common s, श. The remaining words that are common to both lines of the inscription contain the names of the builder of the tope and of his father. Unfortunately some of the letters of these names are of unusual form, but the concluding word *putrasa* proves that the preceding letters must contain two names. I read this part of the inscriptions as follows :

*Sri Tabachitrassa Khamaspada putrasa,*

"(Gift) of Sri TABACHITRA, the son of KHAMASPADA."‡

The date of this tope may, I believe be safely ascribed to the close

\* See "Bhilsa Topes," p. 298

† See *Ariana Antiqua*, Pl. II. of antiquities.

‡ The shorter inscription ends with four letters of which the first two appear to be d and n, for *dan*, a gift. The other two letters are doubtful. I read this inscription as follows :

of the reign of Azas, or about 90 B. C. For the relic chamber, which had evidently not been disturbed since the day on which it was first closed, contained, along with the usual quantity of gold ornaments and gems, four copper coins, all of which are of a well known type of the great Scythian king of Azas. As no other coins were found in this tope, the soundness of this conclusion is, I think undeniable. If this be admitted we have a clear and decisive proof of the prevalence of the Buddhist religion in the Kabul valley nearly one century before the Christian era. But as this fact is still doubted by at least one distinguished orientalist, I will now add another proof of a still earlier date.

All our most distinguished numismatists, French, German and English are agreed on one point, that the last prince of the Greek kingdom of Kabul was Hermæus, and that his immediate successor was the Indo-Scythian Kadaphes or Kadphizes. The date of the Scythian conquest is variously stated, but the extreme difference is less than thirty years. Raoul Rochette\* assigns this event to 125 B. C. Professor Lassen† to 120 B. C. and Professor Wilson‡ to 98 B. C. The near agreement of such excellent authorities may be considered as fixing the close of the Greek dominion in India in the latter end of the second century before the Christian era. This point being established, I now proceed to show that Kadaphes or Kadphizes, the subverter of the Grecian dominion, was a staunch Buddhist.

The coins of Kadaphes, which are of a single type, always bear the same inscription without the change of a single letter. On the Greek side we find in small neat characters,

ΚΟΖΟΛΑ ΚΑΔΑΦΕC ΧΟΡΑΝCΥ ΖΑΘΟΥ.

“(Coin) of *Kozola Kadaphes*, king of the *Koransu*.”

The Ariano Pali legend of the reverse, which is also in small neat

*Bhagawāna-sarirahi Sri Tabachitrasa Khamaspada putrasa dana.*

“(Casket) containing relics of BHAGWA'N, the gift of Sri *Tabachitra*, the son of *Khamaspada*.”

Two similar instances of relic *gifts* occurred amongst the Bhilea tope deposits.

\* *Journal des Savants*, 1835, p. 595.

† Lassen's Greek and Indo-Scythian kingdoms of Cabul, p. 283.

‡ *Ariana Antiqua*, p. 292.

characters, has never yet been fully read. This was partly due to the new style of the titles, and partly to the unusual forms of some of the characters. But my recent discovery of the true forms of the numismatic *ch*, and of its aspirate *chh*, now enables me to give what I believe to be a satisfactory rendering of every letter of the inscription. My reading is (see fig. 27).

*Khushanga Yathaasa Kujula Kaphsa Sachha dharmapidasa.*

"Coin of the king of the Khushang Kujala Kaphsa, the crown of the true *Dharma*."\*

The coins of Kozoula Kadphizes differ altogether from these in size and type and in the Greek legend, but the native legend is almost the same. They bear also two distinct Greek legends although the types and native legends remain the same. The earlier coins have ΒΑΣΙΛΕΩΣ ΣΤΗΡΟΣ ΣΥ ΕΡΜΑΙΟΥ, and were probably struck by the conqueror during the life time of Hermæus. The later coins have ΚΙΖΙΛΙΑΠ ΚΑΔΦΖΟΥ ΚΗΡϚΠ on the Greek side, and on the reverse in bold and well formed Ariano Pali characters the legend (see fig. 28.)

*Kujula Kasasa Kushanga Yathagasa Dhamapidasa.*

On a single well preserved specimen (see fig. 30) I find instead of the single letter *m* in the Pali word *Dhama*, a compound which I take to be *rm*, thus giving the Sanskrit form of *Dharma*. This compound letter may in fact be easily resolved into the Ariano Pali forms of *r* and *m*, the latter having the right horn of the crescent lengthened upwards.†

The same compound letter occurs twice on the coins of *Aswavarma* (in fig. 20) in positions which seem to confirm the correct-

\* I have considered ΖΑΘΟΤ as a royal title, equivalent to the Sanskrit *Kshatra*, of which we have various Greek forms; *Χωατης*, *Χαστης*, *Χωαστης*, *Χαθης*. The last is nearly the same as that on our Indo-Scythian coins. *Zatha* or *Yatha* may however, be the name of a people, the ancestors of the modern *Jâts*. The inscription would then be "(coin) of the Kushanian *Jât*, Kujula Kaphsa, the crown of the true *Dharma*."

† *Piḍa*, पिट, a chaplet or crown, is the Sanskrit word. The compounds *Dharma-piḍa*, the "crown of the *Dharma*," and *Sachha-dharma-piḍa*, the "crown of the true *Dharma*," are I believe, unusual; but they are grammatically correct, and eminently Buddhistical. We have an analogous title in the *Tāj ud-din*, or "crown of religion" amongst the Musalmâns.



ness of the value which I have assigned to it. The differences in the spelling of the names of Kadaphes and Kadphizes I would refer to the issue of different mints, for the coins of Kadaphes are found only in the western Punjab: and those of Kadphizes in Jelalabad and Kabul: the former were most probably minted at Taxila; the latter at Dionysopolis and Kartana.

The constant assumption on all his coins of such common and well known Buddhist titles as *Dharma-pida* "crown of Dharma" (or the law of Buddha) and *Sachha Dharma-pida*, or "crown of the true Dharma," at once stamps king Kadaphes as a staunch Buddhist. The coins of Kadaphes moreover, are marked with a peculiar monograph which is found only upon his coins, and upon those of the single type of Azas, which was discovered in the tope of Hidda.

The proofs which I have given above of the prevalence of Buddhism in the Kabul valley towards the close of the reign of Azas in B. C. 90, and during the whole reign of Kadaphes from B. C. 120, are I think amply sufficient to dispel the doubts even of the most sceptical. In my work on the Bhilsa topes I have already proved the trustworthiness of that portion of the Mahāwānso which treats of the proceedings of the third Buddhist synod and of the consequent dispatch of Buddhist missionaries to convert the people of various neighbouring lands.\* Amongst these, was the *Yona* or Greek country of which the capital was Alasadda, or Alexandria. The date of this event was 241 B. C. in the twenty-third year of Asoka's reign, and the fifteenth year of Græco-Bactrian independence, from which period therefore, we ought to date the establishment of Buddhism in the Kabul valley. Another, and an equally independent proof of the accuracy of this portion of the Mahāwānso is afforded by the Chinese pilgrim Hwan Thsang who saw a stupa at *Na-kie-lo-ho*, or Nagrihar, near Jelalabad which was built by the king *Asoka*.

I will now say a few words regarding the religion of Kanishka and the other Indo-Scythian princes of Kabul and the Punjab, whose Buddhism has been doubted on account of the Mithraic reverses of their coins. The Rāja Taranginī† expressly mentions that during the long reign of the three Turushka (or Turki) kings Hushka,

\* Bhilsa Topes, p. 120.

† Book I. V. 170, 171.

Jushka and Kanishka, Kashmere was in the hands of the Buddhists, and that the kings themselves built monasteries and temples for the worship of Buddha. The memoirs of the Chinese pilgrims Fa Hian (A. D. 400) and Hwan Tshang (A. D. 640) also ascribe the foundation of numerous topes in Peshawur, and Gandhāra to the prince *Ki-ni-kia* or *Kia-ni-se-kia*, that is to the Kanerki of the coins and the Kanishka of the Rāja Tariugini. I have no doubt therefore of the Buddhistical faith of the princes themselves, but I believe that the old Sabæanism of the east, which is fully represented on the reverses of their coins, was still the prevailing religion of the people. The first Kadphizes who calls himself “the crown of the *Dharma*” on the reverses of his coins, yet places a figure of the Grecian Hercules within the circle of the legend. In a similar manner the Indo-Scythian Oerke or Hushka who is seen with a Buddhist prayer cylinder in his hand on the obverses of his gold coins,\* yet gives representations of the sun and moon, and of the five elements on their reverses. The Buddhist religion was eminently a tolerant one, and I presume that the Buddhist princes may have placed these Sabæan figures on their money with the sole view of gratifying the mass of their subjects amongst whom it was to circulate.

The last coins which I shall notice, are those of the family of Gondophares, which are highly interesting for several reasons: but more particularly on account of the very strong probability that this Gondophares is identical with the king Gundaforus who put Saint Thomas to death. The coins of Gondophares are common in Kabul, Kandahar, and Sistan, and in the western and southern Punjab. All these countries therefore, must have owned his sway. He was besides the head and founder of his family as no less than three members of it claim relationship with him on their coins: *Orthagnes*, his full brother, *Abdagases* his nephew, and *Sasa* (or

\* See the accompanying plate of Indo-Scythian relics, in which fig. 1 represents the Tibetan prayer-cylinder of the present day:—fig. 2 is a bronze badge, and fig. 3 is a coin of Oerke, both representing the prayer-cylinder in the manner in which it may now be seen in the hands of the Buddhist Lamas of Thibet. The prayer-cylinder was certainly in use in Ladák as early as 400 A. D. when Fa Hian visited that country.

*Sasan*) a more distant relation. The coins of Orthagnes are found in Sistan, and Kandahar; those of Abdagases and Sasan in the western Punjab. I presume therefore, that they were the viceroys of those provinces on the part of the great king Gondophares, who himself resided at Kabul. All the names are those of Parthians, but the language of the coins is Indian Pali. Abdagases is the name of the Parthian chief who headed the successful revolt against Artabanus in A. D. 44. The great power of Gondophares, and the discovery of a coin of Artabanus countermarked with the peculiar monograph of all the Gondopharian dynasty, make it highly probable that the Indo-Parthian Abdagases was the same as the Parthian chief, whose revolt is recorded by Tacitus\* and Josephus.† This surmise is very much strengthened by the date of the revolt, A. D. 44, which would make Gondophares a contemporary of Saint Thomas.

The peculiar monograph of all the coins of this dynasty affords a most curious and striking proof of the prevalence of the Indian language beyond the Indus. At first I thought that the name of Gondophara‡ was some compound of Phra or Phara which is found in so many Parthian names. But about three years ago when I was sketching a sugar-mill, the true meaning of the name flashed suddenly upon me. I have given a sketch of the common Indian sugar-mill in fig. 31, in which it will be observed that the outer channels for the cane-juice are chiselled in the very form of this peculiar monograph, which therefore, must be a pictorial representation of the compound name *Gānda-phor* गाण्डफोर, or "sugar-cane crusher." I have never heard this term used, but it is regularly formed, and is in strict keeping with *Kāth-phor*, the "wood-breaker," and *Pathar-phor*, or the "stone-breaker," which are the common names of the wood-pecker.

My object however, is not to speak of Gondophares himself, but of his relative Sasa or Sasan, whose coins exhibit the very same

\* Annal. XV.—2.

† Antiqua, XX. iii.—2, Josephus calls the father of Abdagases, *Kinnamos*: Tacitus names him *Sinnakes*.

‡ On the bust coins the name is TNAOΦEPPOT: on the horseman coins it is FONAΦAPOT. The native legend however, is the same on both, "*Gondophara*."

forgetfulness of propriety, which I have already described as shown by those of Kozoulo Kadphises and the Indo-Scythians. Thus Sasan also calls himself the "crown of the true Dharma," in a neatly engraved legend placed around a figure of Jupiter holding out a victory! There are two different types of the coins of Sasan; the one rare, the other common, both of which I will now describe.

*Fig. 29.* Round copper coin of middle size weighing 151 grains—rare. See R. Rochette, Pl. II. fig. 16, and *Ariana Antiqua*, Pl. V. fig. 19: also Pl. XV. fig. 2 of my unpublished plates.

*Obverse.* Horseman as on the coins of Azas. Greek legend always corrupt and incomplete, but on some specimens the letters ACHC are legible below the horseman. Before the horse the Gondopharian monograph.

*Reverse.* Jupiter standing and holding out a figure of victory. Ariano-Pali legend complete, excepting only a few letters which I have supplied without hesitation, as the wanting letters are too obvious to be mistaken.

*Mahārājasa Rājadhīrājasa sachha dha (ma-pidasa) Sasasa.*

"(Coin) of the great king, the king of kings, the (crown) of the true Dharma, SASA."

*Fig. 30.* Round copper coin of middle size, weighing 156 grains, see *Ariana Antiqua*, Pl. V. fig. 20; and my unpublished plate XV. figs. 1, 2, 3—common.

*Obverse.* Horseman as on the other, but the Greek legend is always jumbled.

*Reverse.* Jupiter with the *hāsta-pura*, moving to the right. Ariano-Pali legend in bold legible characters.

*Mahārājasa Mahatasa trīdatasa Deva-hadasa Gondophara Sasasa.*

"(Coin) of the great king, the mighty, the preserver, (of the race) of the divine Gondophares, SASA."\*

I have taken *Deva-hada* to be the Pali equivalent of the Sanskrit *Deva-hridya*, देवहृद्य, the "god-hearted," of which we have a counterpart in the Greek Θεορπος. I have before me about thirty good

\* The Ariano-Pali name is written *Sasasa*, which I take to be the same as the well known name of *Sassan*, the progenitor of the Sassanian dynasty. I possess about thirty legible specimens. It is possible that this *Sasa* or *Sassan* may have been the ancestor of Ardsbir the son of Babek.

specimens of this type, all of which agree in every letter of the legend. There is therefore, no doubt about the reading of the letters.

I cannot close this account without saying a few words in favour of my claim to the discovery of the true values of eleven letters, or of just one-third of the Ariano-Pali alphabet. The whole number of single-letters amount to thirty-five, of which Jas. Prinsep had assigned the true value to seventeen, or just one-half. To Mr. Norris is due the discovery of six single letters of which two are the monumental forms of *ch* and its aspirate; and the form of one letter *jh* still remains unknown. Of the nine known vowels (five initial and four medial) seven were determined by Jas. Prinsep, and two by me. Of the few compound letters which are at present known, the numismatic *anuswara* was discovered by Jas. Prinsep, the monumental one by Mr. Norris: but the attached *r* in *kra*, *tra*, *dra* and *stra*; the attached *t* in *st*, the attached *m* in *rm* are all due to myself. The single letters of which I claim the discovery are *g*, *gh*, *ng*; *ch*, *chh*; *t*, *d*; *ph*, *b*, *bh*; *v*; all of which, with the exception of the fourth and fifth, were made known in this Journal before the publication of Mr. Norris's alphabet in the Journal of the Royal Asiatic Society for 1846.

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*Examination and Analysis of two specimens of Coal from Ava, by*  
H. PIDDINGTON, *Curator Museum Economic Geology.*

I am indebted for these two specimens to Captain Niblett of the H. C. Steamer *Sesostrie*. Of No. 1, we have a capital supply of a maund or more, but of No. 2, we have only a little in a box; but quite sufficient to shew that it is altogether a different coal even by inspection: and with specimens of coal these remarks are not superfluous, for it is only by a good large supply of the coal that its quality can be fairly judged of and fair samples taken for analysis.

No. I.

SEMI-BITUMINOUS COAL.

No locality has been given with these specimens but we have in the collections of the Museum specimens in Major Burney's series

from Ava (Journal Vol. I. 1832) exactly resembling both these coals, and Mr. Jas. Prinsep, Vol. VII. p. 198, gives an analysis of a jet coal which is there entitled as, "From Kyendwen River;" and that specimen which closely resembles No. I. is labelled, "*From the sand banks Kyendwen River*;" so that the banks of this river are probably the locality of both of them. Both are moreover only "top coals" and thus we are no doubt giving an examination of inferior specimens to what the deeper beds will furnish when mined.

This coal is of the class which would be called semi-bituminous or steam-coal at home. It is tolerably tough and in alternating bright shining and dull laminæ, the proportion of the dull ones being much the largest. The bright laminæ are brittle and cannot be cut, the dull ones yield to the knife like jet-coal.

It flames well but does not melt, and its fine powder has the peculiar quality of coking to a tough and almost flinty coke in the crucible, which requires smart pounding to pulverise it.

The coke of the coal itself is of a bright steel grey, and with a close texture, the coal swelling a little and separating at the laminæ but retaining partially its shape. It burns very slowly, even when pulverised, and the ash is of a pale fawn red.

The smoke of the gases has the agreeable smell of good bituminous coal.

It is nearly free from sulphur of which there are only traces.

Its specific gravity is, ..... 1.23

Its contents in 100 parts are :

Water (by independent experiment, .....	4.25
Gaseous, .. .....	26.50
Carbon, .. .....	67.85
Ash (pale red), .. .....	1.40
	<hr/>
	100.00
	<hr/>

This coal has then, evidently, all the properties of a first rate steam-coal; and I place below the analysis of two of the choice Welsh steam (red ash) coals.

	Ava coal, No. 1.	Pont-y-pool† Mushet.	Rosser-William's‡ Mushet.	Remarks.
Gaseous, . . . . .	80.75*	28.50	30.00	*with water.
Carbon (coke), ..	67.85	69.00	68.50	†a well known coal.
Ash,* . . . . .	1.40	2.50	1.50	‡Mynyddysburgh vein.

So far then as laboratory research will inform us this is a first rate coal; but I need not remark that the character of all coals depends greatly, especially in India, first upon how they are burned, and again that they are fair averages from the mine; and indeed with reference to No. II, if it is from near the same locality, that this coal, No. I. be not adulterated by a mixture of it. As to the burning, there can be no doubt that between the effects of climate the negligence of the stokers, and often the little attention paid by the engineers, much of our heating power has been wasted in India.

#### NO. II.—INFERIOR JET COAL.

This is a dull, slaty-looking coal, dividing in the weather-worn specimens into very thin laminæ and having on the weathered edges orange-red iron-stains.

It flames well and does not melt. Its powder does not coke at all like No. I. nor does the coal (as might be expected) shew any signs of coking; a lump of it in a closed silver crucible giving off its gas very readily but scarcely altering in appearance.

It contains a small portion of pyrites which are seen to have decomposed on the surface and between the laminæ in small spots.

Its specific gravity is 1.42.

Its contents in 100 parts are as follows, and I place next to my

\* I have noted above that our coal and Welsh coal are all red-ash coals. The Pontypool ash contains lime, which ours does not.

results Mr. Prinsep's from his specimen Journal Vol. VII. p. 198, which are evidently not from the same coal, though from its appearance, it might be taken for it.

	Our present jet coal. H. Piddington. 1854.	Kyendwen coal. Mr. J. Prinsep. 1832.
Sp. Gravity, . . . . .	1.42	1.363
Water, . . . . .	11.88	8.00
Gaseous, . . . . .	32.12	40.00 (32.00, less
Carbon, . . . . .	32.60	54.00 [water].
Greyish white ash; does not effervesce,	23.40	5.90
	100.00	107.90

There is evidently some error of the press in Mr. Prinsep's table, but we can only conjecture that it may have happened that he forgot to subtract the 8.00 of water from the gaseous (volatile) result in the first operation when he had ascertained it as usual by an independent experiment which would leave 32.00 for the gases properly so called. Mr. Prinsep has not noted the colour of his ash which would perhaps enable us to ascertain if it was the shale of No. I. It is certain that No. II. is not the mere shale of No. I. on account of the difference of colour of the ash.

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*Literary Intelligence.*

A Catalogue of the Sanskrit MSS. in the Royal Library at Berlin, by Dr. Weber, is the first of a series of catalogues of the MSS. in that Library which has been in progress since 1842 by order of the Prussian Government, on which the undertaking reflects great credit. The plan originated with Dr. Pertz, on his being appointed chief librarian of the Royal Library at Berlin, and at his suggestion Government directed that the first grants should be assigned to cataloguing the oriental MSS. As to the form of the catalogue it



was agreed to specify the number, material, form, binding, number of pages and contents of each volume, and to notice any obvious lacunæ of the text or other deficiencies, appending at the same time a systematic table of contents, and a double index of authors and works, alphabetically arranged.

Dr. Röer has kindly drawn up from Dr. Weber's introduction the following sketch of the growth of the Sanskrit collection in this library.

"The first purchases in the Sanskrit department were made by the late Professor Wilkens, the immediate predecessor in office of Dr. Pertz, who bought in 1827 several MSS. which were formerly in the possession of the Serampore College and had been acquired by Professor Bernstein during his stay in England, viz. Nos. 456, 463 and 485 (three Purāṇas) 831 and 838 (arithmetic and astronomy), 1335 (prayers) and 409 (Bhagavadgītā). During his visit in England in 1829, Wilkens purchased through Messrs. Trenttel and Wurz, for £400, a collection, consisting of 205 Arabic and Persian and of 16 Sanskrit MSS. made by J. Murray since 1796: and in 1834 he was fortunate enough to acquire, by the mediation of Fr. Rosen, at the comparatively moderate cost of £105, a fine MS. of the Mahābhārata, including the Harivansa, with several commentaries, in 9 vols. folio, (Nos. 392 to 400): the latter formerly belonged to Sir G. Haughton.

"The Chambers' collection forms the most valuable part of this section of the Royal Library MSS. Dr. Pertz thus details the history of its acquisition.

"This valuable collection was made in India during the last quarter of the 18th century. Sir R. Chambers, an eminent man of thorough and various attainments, collected during his residence in Calcutta from 1774 to 1799, an Indian Library of great importance, and acquired, at a cost of £25,000, it is said, a great number of MSS. unparalleled as regarded Vedic literature and containing many important works in other branches of Sanskrit literature. From the papers, added to this collection, it appears, that soon after his arrival in India, he entered into communication with distinguished native scholars; thus he consulted pandit Mana Kṛishṇa Tripattī on the Veda literature, on the Sāma Veda, Ananta Rāmarāja, on the

Yajur Sheve Kumjee Doobeh, and on the literature of the Purāṇas Harināma Kaula, who is mentioned as Harry Ram Cowl, and devoted a particular attention to the examination and the acquisition of legal works. The collection of pandit Govardhana Vyāsa, which contained among other works 6 Purāṇas, and also those of Devadatta Ojhā, of Krishṇadatta and of Siva Lāla Ojhā, were purchased in 1783, and in 1785 Sir Robert acquired a number of pieces of the Sāma Veda from Ibrahim Vaha.

“The 78 MSS. bearing dates from Samvat 1831 to 1855, are probably transcripts made by order of Sir Robert. The copying of the Vedas, according to a statement of the last owners, has cost about £1000. The collection contains a few MSS. of the 14th century and several of the 15th; their number increases in the 16th, and attains its maximum in the 17th, although it is still considerable in the 18th century. Even in India it attracted great attention, and many references were made to it.

“In 1799 Sir Robert returned to Europe with broken health, and after his decease, in 1803, the collection remained in the possession of his family. Several negotiations to sell it to the British Museum, the Russian and Bavarian Governments, were not successful. Ch. Wilkens drew up, in 1825, a catalogue for the British Museum, but the sale of the collection was not effected in consequence of the high price asked for it. Some years afterwards, W. von Humboldt conceived the idea to acquire those MSS. for Prussia, and proposed to the Government to make an offer of 30,000 Thalers Courant. The sum, however, appeared too high, and the proposal was declined. In 1829 Fr. Rosen, at the request of Lady Chambers, made a catalogue of the collection, 210 in number, which was published in order to bring the treasures of the collection to public notice. This measure also failing, Mr. Robert Chambers, after the death of his mother, had a new catalogue prepared by Mr. Forbes, which was printed in May, 1841. The public was at the same time informed by it, that the sale of the collection would take place on the 13th April, 1842. Thereby induced and on the urgent entreaties of Lassen and Höfer, Chevalier Bunsen, then Prussian ambassador in London, again took the matter up, and by a cabinet order of the king of Prussia of the 20th May, the

purchase of the collection was sanctioned. No offer having been made on the 18th April, and one by the French Government after the day of the sale not having been agreed to, the negotiations on the part of Prussia were carried on by Ch. Bunsen through Professor Höfer, and on the 20th May the purchase was effected for the sum of £1250.'

"On the plan of his catalogue Dr. Weber remarks (p. xxii. preface),—'After the names of the author and the work have been given, it is stated, where and by whom the work has been edited. Then follow the number of the chapters and of the pages, with the signature of the copyist, the date of the copy, the extent of each chapter, the number of its verses, and its name. Then the commencement of the work is given together with such dates from its introduction and its close as may throw light on the person and the circumstances of the author and the time he wrote. When describing works of importance and especially such as have been hitherto unknown, I have added the commencement of each single chapter and sometimes also other extracts; on the other hand, I have given as short a notice as possible of works which have been published, or are in the course of publication, unless the MS. exhibited a great difference from the published text.

"'The arrangement of the different parts depends upon the place which they respectively occupy in the literary history of India, and in this respect I refer to my lectures on the history of Indian literature. Within every division I have arranged the numbers, as far as practicable, chronologically, with this restriction, however, that the commentaries and similar writings are placed next to those works which they explain, or of which they treat.'

"This arrangement of his literary materials is in accordance with the rules of logical analysis, and Dr. Weber was fully justified in rejecting the division of old Hindu writers by which the whole body of Sanskrit literature is classed under three principal heads which have 14 subdivisions. That part of the catalogue which refers to Vedaic literature, is the most comprehensive, but the whole work has been executed in a scholarly manner and with great accuracy. Dr. Weber's lectures, above quoted, have solved and elucidated many questions previously obscure or lost sight of.

“Catalogues such as these are not only a saving of time and trouble to the literary student, but are, moreover, guides to the discovery of works, buried and, for all practical purposes, lost in libraries of private individuals, who, in not a few cases, knew not, and, in others, act as though they knew not, the value of the treasure and the trust of which they are accidentally the custodians. This remark applies with especial force to the known stores of Sanskrit literature, a history of which has never been attempted by Hindu writers, what is known of it being mostly derived from general classifications and occasional notices and references, found in works dedicated to scientific research. There are a large number of Sanskrit works, unknown even to native scholars, notwithstanding that they are within the range of their particular studies, and such works ought surely to be preserved in the archives of a public library, where alone they can assume the due and practical importance which belongs to them. The several collections of Sanskrit works, made chiefly by Englishmen towards the close of the last and the opening of the present century, may embrace as valuable a portion of Sanskrit literature as any that may yet remain hidden, still the known, compared with the unknown, is probably but a fraction, and not a considerable one. For a collector of MSS. it is of the highest importance to know, whether a work with which he may meet, is already to be found in collections, information which can only be obtained from published catalogues. The collection of Fort William as well as those of the Sanskrit Colleges of Calcutta and Benares respectively have been embodied in the catalogue, printed by our Society, which however is very imperfect and often incorrect. Professor Hall is now preparing a descriptive catalogue of the Sanskrit collection in the Library of the Benares College, and has already met with a great number of works in all branches of Sanskrit literature, works hitherto unknown to us.”

Dr. Rœer's concluding remarks on the value of Catalogues are quite to the point and his strictures on our Society's Sanskrit Catalogue, compiled so far back as 1838, merit the attention of our Philological Committee. A revised English Catalogue of our MSS. in the *Raisonné* form, such as we now have for the St. Petersburg, Leyden and Berlin collections, is a great desideratum, and it should

embrace all the Sanskrit MSS. traceable in private collections in the neighbourhood of the Presidency. It is probable that such native gentlemen as have MSS. would cordially respond to any invitation to produce them, which might emanate from the Society.

The Royal Asiatic Society has just published a descriptive catalogue of 163 Arabic and Persian MSS. which form the historical portion of its collection. The work is edited by Mr. Morley, and contains a short analysis of each history, mentioning where extracts have been published by Sir H. Elliot. It further gives such information as is available of the author of each work, and describes the exact size of each volume. Garcin de Tassy has noticed some of the more important MSS. of this collection in a late No. of the *Journal Asiatique*.

In No. 12 (May and June) of this same Journal M. Deffrémey commences a paper entitled '*Nouvelles Recherches sur les Ismaéliens ou Bathiniens de Syrie*,' better known under the designation of Assassins. The author announces that he has had access to sources, some of which were not consulted by Falconet, De Sacy and Quatremère and others of which were far from being exhausted by them. A paper by M. Garcin de Tassy follows on the proper names and titles in use by Musalmans, and the No. concludes with a list, alphabetical and chronological, of the names given by Chinese emperors to the years of their reigns from the Han dynasty downwards, and drawn up by M. de Meritens. M. Chodzko replies to the Kazan professor's criticisms of the new system of pronunciation introduced into his Persian Grammar. The No. concludes with an obituary notice of M. Marcel, one of the founders, and since 1847 a 'Censeur' of the Paris Society.

The July No. contains M. Mohl's Annual Report from which it will be seen, that the object of the recent changes in the mode of publishing our *Bibliotheca Indica* is appreciated in Europe. The learned Secretary's remarks on the value of such collections as are now being published in Paris as well as in Calcutta are striking. The Chinese and Tibetans have long since anticipated us, the collection in the former language made by the emperor Kienlong, being represented to equal in size about 30,000 vols. of an European library. The Turks at Constantinople and

the Armenians at Venice are yet engaged on the publication of a series of their national authors. The 'colossal enterprize' of our own Elliot is noticed in connexion with this subject, and with a touching allusion to the heavy loss occasioned by his death.

No. III. of the *Zeitschrift* of the German Oriental Society opens with a notice, by Professor Pott, of the recent contributions to Comparative Philology in the works of Norris, Rüs and Crowther on several dialects of Central and Western Africa. Graf discusses with reference to statements put forth by V. Hammer and Spiegel, the interpretation to be put on the 'D'Sulkarnein' or 'two-horned' of the 18th Surah of the Korân. He maintains with the best commentators on this work, that the allusion is to Alexander the Great. Some suggestive remarks follow, by Benfey, on the figures and names of divinities on Indo-Scythian coins, and on the interpretations given to them by Lassen. Dr. Roth translates passages from the Rig Veda which describe the ceremonies attending the burial of the dead in ancient India, and which show how opposed were the tendencies of the old Hindu ritual to the practice of Sutti, subsequently introduced by the Brâhmins. A paper by Blan on the modern history of Syria, and the continuation of one commenced some months back by Von Hammer on Saalchi conclude the No.

Among the correspondence, is a letter from Dr. Von Erdmaun of Novogorod on the question lately discussed by Dr. Sprenger and Professor Fleitcher regarding Muhammad's communications with the Monk Boheira during and subsequent to the prince's journey to Syria.

No. 2 of the *Journal* of the American Oriental Society opens with a translation, by Mr. Harrington of Ceylon, of the *Siva-Pirakâsam*, a metaphysical and theological treatise in Tamul, about two hundred years old. Then follow a notice, by Mr. Whitney, on the Vedic texts, a paper on the Talaing language, by Dr. Mason, and two others on the Karens, with a comparative vocabulary of their two dialects, the latter by Mr. Brown of Assam. A notice of Mr. Perkins's translation of a Syriac Life of Alexander the Great found in MSS. at Ooroomiah, but which proves to be nothing more than a Syriac version of Callisthenes, concludes the original contents of the No.

Among the correspondence is a highly interesting letter from Dr. Loddell at Mosul, dated a year ago, but so full of promise for further discoveries, that we will give an extract from it.

"Nebbi Yunus is a little South of Koyunjik, but still remains almost intact, from the superstitious dread of the Mohammedans of disturbing the repose of Jonah, to the lofty *jam'eh* over whose tomb the Moslems go every Friday in great numbers from Mosûl, a mile distant, to pray. Helmy Pasha, the present governor of this district, did excavate somewhat in that mound last year, and found several large bulls and human giants, much injured by fire, and a few small antiques; among other things, a bronze lion on one side of which was an inscription which Col. Rawlinson reads: *Esarhaddon—the conqueror of Misraim and Cush*. Other inscriptions are said to assert that this mound of the prophet was built by captive women, and that of Koyunjik by men, from Babylonia.

"The Pasha's object in setting his manacled prisoners to work in a cellar, where one of the bull's heads was accidentally discovered, was to find gold, and he instructed his overseers to search carefully under the feet of the bulls for treasure! None appearing, he desisted; the inhabitants refused permission to the English and French to continue the explorations, and the antiquities of Nebbi Yunus are likely to be for some time yet undisclosed.

"A company has recently been formed in London for the purpose of excavating in the mounds of Lower Mesopotamia and Assyria, entirely independent of the British Museum, though it is expected they will work under the charter granted Mr. Layard and his patrons, which allows the removal to England of all objects discovered.

"The French are obliged to offer the Sultan one-half of all they find, and a late attempt of Mons. Place, the French Consul in Mosûl, to raft some fine bulls and winged human figures to Baghdad and Busrah, was opposed by the Pasha on the ground that he had not given the Cabinet of Antiquities lately opened in Constantinople, an opportunity to take the share due to the Turkish Government. These large slabs were drawn from Khorsabad, about twelve miles distant, on a cart built by the Consul expressly for the purpose in the strongest manner, the wheels being about twenty inches in dia-

meter, without spokes, by some three hundred Arabs for whom harnesses were made to order. The blocks now lie on the eastern side of the Tigris, under rude mud coverings which were built to prevent the sulphate of lime of which they were composed, from speedy decomposition. Sandstone was sometimes used for bulls in Nimroud, but gypsum was the common material, and this soft marble is susceptible of being most delicately wrought. It is easily worn by water, and even the rains of this hot climate are sufficient to decompose it very rapidly. It is only the immense mass of earth above the Assyrian sculptures which has preserved them from age to age.

"It is presumed that permission will be given to Mons. Place to remove the sculptures, which are destined for the Louvre, as application has been made to the French ambassador at the Porte, who is now in quite as good standing at Constantinople as Lord Stratford, and in fact wields almost as much power as the Sultan himself.

"Mr. Loftus, who was recently attached to the Commission appointed to run the boundary-line between Turkey and Persia, as geologist, passed through Mosul a few days since on his way to Baghdad, in charge of the expedition fitted out by the newly formed English company. He expects about £20,000 to be placed at his disposal, and, with the advice of Col. Rawlinson, he will first lay open some of the sarcophagi in the great series of mounds at *Warka*—by some supposed to be the Ur of the Chaldees—and then explore various other *tells* in Mesopotamia. Should nothing of great interest be found there (you know that but few sculptures have ever been discovered in Babylonia, as gypsum-quarries are wanting there), he will come northward and continue the excavations so auspiciously begun by Layard and vigorously prosecuted by Rawlinson. The latter was just about to cease operations for the British Museum, and to send home the artist, when a discovery was made which promises to be not inferior to any made by Layard. The Colonel has not till recently had great success in excavating: a few slabs were found at Nimroud, some bricks, and ivory and copper utensils, with one or two basalt obelisks, well broken in pieces; and some large earthen cylinders, said to be of considerable interest, as at least one hundred years older than the sculptures of Nimroud, belonging to the time of Tiglath Pileser, turned up at Kalah Sherghat. Small



books—blocks of a light coloured clay, finely written over with arrow-heads—have been found in considerable numbers at Koyunjik, enough, indeed, to form quite a library, with vases, scarabei, cylinders and seals; but it was not till last week that anything of special interest was exhumed. I shall presume that you will be glad of a detailed account of so much of the new palace as has been laid open, since Rawlinson will not publish anything on the subject for some time to come. It will give me pleasure to communicate to you the result of further excavations, which, it is presumed, will now be prosecuted with considerable vigour, instead of being brought to a speedy close, as was anticipated."

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,

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FOR OCTOBER, 1854.

At a meeting of the Society held on the 11th instant, at half-past 8 P. M.

Bábu RÁMGOPÁL GHOSE, Vice-President, in the Chair.

The minutes of the last month were read and confirmed.

Presentations were received—

1. From the Government of Bombay through Lt. Fergusson in charge of the Magnetical Observatory at Bombay, Magnetical and Meteorological Observations for 1851.

2. From F. E. Hall, Esq. Benares, a MS. of the *Tarikhé Rahimi*. With reference to the work Mr. Hall states: "The copy is a very old one; in fact I have grounds for believing it to be an autograph. \* \* \* Dilapidated as it is, it is highly probable that it may be thought worth being consulted by another Elliot, if India ever produces a man of kindred tastes."

3. From Professor Oldham, Geological Surveyor, specimens both geological and palæontological from Assam, Tavoy, Tenasserim, Beerbhoom, and the Rajmahal and the Khasia Hills.

4. From the Government of Bengal through Mr. Under-Secretary Young, specimens of Iron Ore from Upper Assam, collected by Capt. Hannay.

5. From the Government of India through Mr. Secretary Allen, specimens of Smelted Iron and Iron Ores from Ramghur, Kumaon, forwarded by Lt.-Col. H. Drummond.

6. From C. Trevor, Esq. on behalf of Capt. Porter, 10 Burmese MSS.

7. From Lt. Chase, a Hand-book of the Burman language.

8. From H. Stainforth, Esq. C. S. through Capt. Thuillier, Ancient Hindu Sculptures from the ruins of Gour.

W. Muir, Esq. C. S. duly proposed and seconded at the last meeting, was balloted for and elected an ordinary member.

The following names were announced for ballot at the next meeting.

G. A. Bushby, Esq. C. S.,—proposed (for re-election) by C. Allen, Esq. seconded by Mr. Grote.

F. A. Lushington, Esq. C. S.,—proposed (for re-election) by A. Grote, and seconded by Bábu Rámgópal Ghose.

Lt. Nicolai W. Elphinstone, 4th Regt. N. I. Assistant Commissioner in the Punjab,—proposed by Lt. Lees and seconded by Capt. James.

Lt. H. S. Bivar, Jun. Assistant Commissioner in charge of Northern Cachar,—proposed by Capt. Dalton and seconded by Mr. Grote.

T. Boycott, Esq. Bombay Medical Service, Assay Master, Calcutta Mint,—proposed by Dr. Falconer, and seconded by Mr. Allen.

Communications were received—

1. From Bábu Radhánath Sikdar, enclosing Abstracts of meteorological observations taken at the Surveyor General's Office, Calcutta, during the months of June and July.

2. From C. P. Carmichael, Esq. Assistant Secretary to the Government of the N. W. Provinces, forwarding Meteorological Observations kept at the Secretariat Office at Agra, for the month of August, 1854.

3. From W. Theobald, Esq. submitting the following papers:

1.—On the Geology of the Salt Range.

2.—Notes on the Nidification of some of the commoner birds of the Salt Range with a few additional from Kashmir.

4. From the Government of Bengal through Mr. Under-Secretary Young, communicating a paper entitled "Notes on the languages spoken by the Mishmis," by W. Robinson, Esq.

5. From Bábu Rájendralál Mittra, submitting notes "on the Peculiarities of the Gáthá dialect."

6. From Capt. Dalton, Debrughur, enclosing a paper, by Mr. W. Robinson, "On the ancient history of Assam."

7. From Dr. Campbell, Darjiling, forwarding some "Notes on Eastern Thibet."

8. From Mr. Blyth, submitting a "Memoir on the Indian species of Shrews."

The Librarian and the Curator in the Zoological department submitted their usual monthly reports.

J. W. COLVILLE, *President*.

*Confirmed 3rd Nov., 1854.*

*Report of Curator, Zoological Department, for September, 1854.*

During the last few days, the Society's Museum has been enriched with numerous specimens of interest.

1. In a box addressed to the Secretary, and marked Moulton, care of Babu Ananda Chandra Basu, Sub-Assistant Surgeon,\* have been sent a bottle of *petroleum*, which has been made over to the Geological department, and the skin of a small Fox, with skull and several other bones of another individual of the same species.

This little Fox pertains to a species hitherto undescribed and merely vaguely indicated, which I have long sought to verify. The Hon'ble Mount Stuart Elphinstone remarks, of the Foxes of the great Hurriana desert, that these "are less than our [the English] Fox, but somewhat larger than the common one of India: their backs are of the same brownish colour with the latter; but in one part of the desert, their legs and belly up to a certain height, are black, and in another, white. The line between those colours and the brown is so distinctly marked, that the one kind seems as if it had been wading up to the belly in ink, and the other in white-wash." (*Account of Cabul, &c.* p. 7.) Mr. Walter Elliot would not appear to have discriminated this small Fox of W. India from V. *BENGALENSIS*; further than by the observation, that—"It is remarkable that though the brush is generally tipped with black, a white one is occasionally found; while in other parts of India, as in Cutch, the tip is always white." (*Madr. Journ.* X, 102.) We have little doubt that Mr. Elliot's supposed variety of V. *BENGALENSIS* with white-tipped tail, refers to the present species: but Mr. Griffith's smaller Fox of Afghanistan (*J. A. S.* X, 978,) is different; and so we now consider Mr. Theobald's small Fox of the Punjab salt range (*J. A. S.* XXII, 581,) to be, and this may bear the appellation V. *FUSILLUS*. The small desert Fox of W. India may be designated

V. *LEUCOPUS*, nobis. It is a typical *VULPES*, which V. *BENGALENSIS* is not; of the size of *BENGALENSIS*, or smaller than *FUSILLUS*. The specimen under examination is an adult female: general colour pale; the

\* This box was delivered at the Museum by a servant, who stated that his employer had died on the journey down, and that he had accordingly taken charge of his late master's property, including the box here noticed.

3. Capt. S. R. Tickell, Maulmein. Various bird-skins, including *CRYPHIRINA VARIANS*; *GARRULAX CHINENSIS* (shot about 100 miles south of Maulmein, associating with the common *G. BELANGERI* of the Tenasserim Provinces); *EMBERIZA AUREOLA*, Pallas (of which *Euspiza flavogularis*, nobis, *J. A. S. XVIII*, 811, proves to be the same bird when not in its nuptial livery); and *GALLOPHASIS LINEATUS*.

4. Capt. Fletcher Hayes, Lucknow. Skull of *VULTUR MONACHUS*.

5. Mr. R. Spears. An enormous tree-fungus, which was picked up floating in the Brahmaputra, and is considered by Dr. Falconer to be an undescribed species of *POLYPORUS*, which he designates *P. MELADERMA*.\*

6. Dr. E. F. Kelaart, Galle. Various reptiles, and a fine collection of Cinghalese insects, sent in spirit.

7. W. Theobald, Esq. Junr. A considerable number of specimens in

banded more or less obscurely, the reddish-brown ground-hue becoming paler and brighter on the thighs posteriorly, where mottled and spotted with black. Hab. Pegu, Mergui, and the Malayan peninsula.

*ENGYSTOMA* (?) *INTERLINEATUM*. *n. s.* Hind-feet more webbed than in typical *ENGYSTOMA*: the belly and under surface of the thighs tuberculated; with also a few larger warts on the thoracic region. Length of head and body,  $1\frac{1}{4}$  in.; of hind-limb,  $1\frac{1}{2}$  in. Colour, a golden clay-brown above, with medial blackish vertical streak, diverging into two at the nape, which are continued to the base of each hind-leg, and when the hind-leg is closed, it appears to be continued on to the limb. Anteriorly to the eyes, a narrower branch passes over the orbit and is also continued to the base of the hind-limb; and a median duller line appears on the croup, which abruptly diverges widely towards the vent. Narrower intermediate lines are also traceable; and the principal streaks are set off by a pale golden edge. Limbs beautifully banded; the tarse dusky posteriorly. Throat and breast blackish; the tuberculated belly and thighs tinged with yellow. Sides black, continued in a straight line from the nostrils and eye, and strongly contrasting with a bright pale golden edge above. Hab. Pegu.

*E. CARNATICUM* is identified from a drawing sent by Mr. Jerdon, and the same species was procured by Capt. R. Tytler (38th N. I.) at Dacca, and by Mr. Theobald in Birbhúm.

\* "*POLYPORUS*. *Sect. Apus*, (*Fries, Syst.*, p. 359).

"*P. MELADERMA*, *Durus*, *pileo dilatato inæquibiliatrato, margine porisque canescentibus*.

"The size is remarkable; although not unprecedented. *P. squamosus* has been met with in Scotland with a circumference of 7 feet 5 inches, and weighing 34lb avoirdupois; and *P. fraxineus* has been met with in England measuring the enormous size of 42 inches across: the same dimensions in the Asám species being 35 inches. I have made a detailed description of it."—*H. F.*

various classes, of species either quite new to the museum, or hitherto imperfectly represented in our collections.

Among the mammalia, is a fine skin of the Indian Wolf, *CANIS PALLIPES*, Sykes :\* some good Bats in spirit; comprising *RHINOLOPHUS MINOR* (?), Horsfield (v. *lepidus*, nobis, *passim*, vide *J. A. S.* XXI, 347); *HIPPOSIDEROS CINERACEUS*, nobis, *J. A. S.* XXII, 410; *MYOTIS PALLIDIVENTRIS*, (Hodgson), vide *J. A. S.* XXII, 581), from Kashmir; *LASIURUS PEARSONI*, Horsfield (*Vesp. lasyura*, Hodgson), from the vicinity of Darjiling; and others: skull of *ERINACEUS COLLARIS*, Gray (vide *J. A. S.* XXII, 582).† Specimen of *SORICULUS NIGRESCENS*, (Gray, v. *Sorex sikimensis*, Hodgson):‡ *GERBILLUS INDICUS*, from Monghyr; *MUS GERBILLINUS*, nobis, *J. A. S.* XXII, 410 (to which *M. Theobaldi*, nobis, XXII, 583, must be referred as a synonyme); *M. OLERACEUS*, Sykes (or a nearly affined species, perhaps *M. DUMETICOLA*, Hodgson, if not also *M. POVENSI*, Hodgson, *Ann. Mag. N. H.*, XV, 268-9,—merely differing from *M. OLERACEUS* of S. India and also of Asám by having the upper-parts less brightly coloured,—length of male  $3\frac{1}{2}$  in. ; tail  $4\frac{3}{4}$  in. ; *planta*  $\frac{1}{2}$  in.) ;

\* The Society's museum now contains good and characteristic examples of the skulls of the European, Indian, and Tibetan Wolves (*CANIS LUPUS*, L., *C. PALLIPES*, Sykes, and *CANIS-LUPUS-LANIGER*, Hodgson); and the specific distinctions appear to be well marked. The European is the largest of the three, with proportionally much larger and more powerful teeth, and the orbital process of the frontal bone is much less developed than in the others, as likewise the lamdoidal and sagittal crests. The Indian and Tibetan are more nearly affined than either is to the European.

† The *E. MICROPS*, nobis, *l. c.*, has since been designated *E. nudiventer* by Dr. Horsfield, in his catalogue of the specimens of mammalia in the India-house museum (1851).

‡ This species was long ago sent from Nepal, by Mr. Hodgson, to the museum of this Society, and also (it would appear) to the British Museum, by the name *SOREX SOCCATUS*; which Dr. Gray consequently cites as a synonyme: and as another synonyme he correctly gives *S. aterrimus*, mentioned *J. A. S.* XII, 128: but Mr. Hodgson has since *described* a very different species, appertaining to a different group of Shrews, by the name *S. soccatus*, and to which it is more intelligibly applicable. Of his specimen sent to this museum by that name, and also of the identical specimen on which we had previously bestowed the *M. S.* name *aterrimus*, we still possess the skulls. The dentition is that of *CAROSSOPUS*, and not of *CORSIRA* (to which group Dr. Gray assigns the species); but this common little Sikim Shrew does not exhibit the modifications for aquatic habits which are characteristic of *CAROSSOPUS*, Wagler.

from Monghyr district; and *M. SPINULOSUS*, *n. s.*,\* from the Punjab: heads, and a skin of the female, of *Ovis VIGNERI* (mistaken for the very different *O. MONTANA*, Geoff., in Major A. Cunningham's 'Ladak');† and horns for exhibition to the meeting of the *Honglu* or Stag of Kashmir, and of the *Shou* or Tibetan Stag.

Of the former, are one loose pair, and three odd horns; and we have also the pleasure to exhibit a fine frontlet of the same species, sent for exhibition to the meeting by Major A. Broome; and the noble frontlet of *C. CANADENSIS* figured in *J. A. S. XXII*, No. 7.

A glance suffices to shew that the three are distinct species: the Kashmirian being a smaller Stag than the Tibetan, and more nearly affined to the British Red Deer, or *C. ELAPHUS*: bearing horns of a size to suit the Persian *Maral*, which we saw alive in London, and which is most probably the same animal. Indeed, from the series under inspection, it may fairly be inferred that some horns of the adult Kashmirian Stag would be undistinguishable from some horns of the European Stag: though, generally, the Kashmirian are larger, with less ramifying crown; but scarcely larger than some from the German forests,‡ and especially than European fossil specimens, considered without doubt to belong to *ELAPHUS*: these large European specimens, however, have much finer crowns than hitherto appear to have been met with in the Stag of Kashmir. In all, even the finest, horns of the Tibetan Stag hitherto obtained, the crown consists of a simple bifurcation, exhibiting no tendency to ramify further. In those of five individuals of the Kashmirian Stag under review, the crowns of three trifurcate, but without shewing a tendency to further subdivision; and the beam is less abruptly bent at the origin of the median or royal antler, than in the Tibetan *Shou*.§ In Major Broome's

\* *MUS SPINULOSUS*, nobis. Nearly affined to *M. PLATYTHRIX*, Sykes; but of a dark dusky colour above, with fulvous tips to the softer fur: below, and all the feet, whitish. Upper rodential tusks orange, the lower white. Whiskers long and fine, the posterior and longer of them black for the basal half or more, the rest white. Length of adult male (in spirit),  $3\frac{1}{2}$  in.; tail 3 in. (about, the extreme tip wanting in the specimen); plants,  $\frac{1}{2}$  in.

† *O. MONTANA* is the N. American representative of *O. AMMON*; of the same size, but with still more massive horns, bulging more between the angles; also with much black on the front of the neck, where *O. AMMON* is white.

‡ *Vide* description of a pair, in *J. A. S. X*, 749.

§ *Vide* Major Cunningham's representation of simply bifurcating horns of the Kashmir Stag, 'Ladak,' &c. pl. VII. Also figs. 8 and 9 of plate to *J. A. S. X*, 750. And compare these with Mr. Hodgson's highly characteristic figure of the

specimen of the Kashmirian Stag, the prongs of the trifurcate crown are remarkably elongated, the crown subdividing low: and this pair has very much the character of a fine pair of Red Deer horns, and might well pass as such among connoisseurs familiar with the latter. In one of Mr. Theobald's specimens, there is considerable flattening at the crown; and in another, with bifurcate summit, the posterior prong is elongated and much flattened. Lt. Speke, of the 46th N. I., who has himself shot many Kashmir Stags, was astonished at the size of the *C. CANADENSIS* frontlet and horns before the meeting, which he declared were out of all proportion too large for any *Honglu*; but Mr. Hodgson's largest *Shou* horns would appear to equal those of the *Wapiti*; and the Tibetan animal certainly approaches the N. American in size and general character, while the Kashmirian more approximates the European. It will probably be found, however, that the bez-antler is of more regular and constant occurrence in the Kashmirian than in the European Stag; for it is frequently wanting in good-sized specimens of the latter, as it constantly is in those of *C. BARBARUS* of the Atlas range, wherein the crown commonly bifurcates and sometimes trifurcates. The Kashmirian Stag, recognised as a distinct species, and if identical with the Persian *Maral* (as there is every reason to suppose), will stand as *C. CASPIANUS*, Falconer, apud Gray; and if distinct from the *Maral*, as *C. CASHMIRIENSIS*, Falconer, apud Gray.\*

horns of the Tibetan Stag, in *J. A. S. X*, 722, pl. ; where designated *Cervus AFFINIS*.—Since writing this, we have had figures taken of all the Kashmirian horns exhibited to the meeting, *vide* pl.

\* *List of Osteological specimens in the British Museum*, pp. 65, 147 (1847). In his subsequently published 'Synopsis of the species of Deer' (*Ann. Mag. N. H.*, 2nd series, IX, 419), Dr. J. E. Gray identifies the Persian *Maral* and Kashmirian *Honglu*, but applies to them the name *C. PYGÆGUS*, Hardwicke, with *C. Wallichii* as a synonyme, under the mistaken supposition that the Tibetan *Shou* has not the white caudal disk. This nomenclature cannot be conceded. The name *PYGÆGUS* was never bestowed by Gen. Hardwicke; but he erroneously identified his Tibetan Stag with *C. PYGÆGUS*, Pallas, or the Siberian Roe; a widely different animal. *Vide Trans. Lin. Soc.* XIV, 581. It does not appear that Gen. Hardwicke's paper on this animal was even published; but a brief abstract of it is given *l. c.*, stating it to be "a native of the snowy mountains and plains of Muktinauth, about five weeks journey from the valley of Nepal, in a north-west direction.\* The subject examined was a full grown male, 7 ft. 8 in.

\* Muktinauth is not far from the famous Dwalgiri; but on the opposite or eastern side of the Gunduk river, and lies to the north of the great Himalayan range. *Vide* Allen's Map of India.



The only fragments of a bird-skin worthy of notice are the wing and leg of an undescribed species of Gallinule, from the Punjab Salt Range: apparently and doubtless the same as one which we could never identify, as represented in two coloured figures among the drawings of the late Sir A. Burnes, who obtained his specimens in Kabul. He terms it "*Kushkul*: 1 ft. long; 2 ft. from tip to tip." The species seems intermediate to the common *GALLINULA CHLOROPUS* and *PORZANA AKOOL*, (Sykes); and like the latter has no white under the tail, while it agrees with the common Gallinule in the colouring of the head and neck. The specimen of a closed wing presented by Mr. Theobald measures  $6\frac{1}{2}$  in. in length, and is remarkable for having the outer web of the first primary wholly white, as also a broad white border to the outermost and largest feather of the winglet; while the coverts are of a dark slaty ash-colour, instead of being olivaceous (as in both the species cited.) The tarse measures  $2\frac{1}{2}$  in.; middle toe and claw  $2\frac{1}{2}$  in., the latter but  $\frac{1}{4}$  in.; all the claws being much shorter, finer, and of a paler colour, than in many specimens examined of *G. CHLOROPUS*. Burnes's figures represent a *GALLINULA*, rather than a *PORZANA*; with pale crimson irides, and legs and feet apparently of

in length from the tip of the upper lip to the extremity of the very short tail, and 4 ft. 3 in. in height." A more detailed description exists among the Hardwicke MSS. in the British Museum, from which we derived the brief notice and measurements published in *J. A. S. X*, 745, which differ somewhat from the preceding;\* and accordingly Mr. Hodgson is mistaken in supposing (*J. A. S. XX*, 593), that the name *WALLICHII* rests solely upon the authority of a native drawing, a copy of which was published by F. Cuvier.

According to Dr. Gray, "the skull of Dr. Falconer's Kashmir Stag is 15 in. long; the suborbital pit is oblong, triangular, and rather deep. The skull and horns are very like to Mr. Hodgson's specimen of *C. AFFINIS* (*WALLICHII*), but they are considerably smaller.

"Sir John McNeill informs us," he continues, "that they are called by the Persians *Maral*, or *Geoge*, or *Gookhooes*, and the species is frequently noticed in their literature. It is found in all the wooded mountain districts of Persia, but apparently does not occur in the central parts of that country. They rarely descend into the plains. During the summer they are found in the highest wooded parts of the mountains; and during the winter in the lower ravines, near their bases, where they are frequently tracked in the snow. The horns of the adult males closely resemble those of the adult males of the British Red Deer; inasmuch that I doubt whether an unscientific observer could distinguish them, except by the superior size of those of the *Maral*."

\* Compare both with those of the *Wapiti*, taken also from the living animal, in *J. A. S. X*, 738.

the same colour as in the common Gallinule, the orange *garter*, however, less developed. Beak also coloured as in *G. CHLOROPUS*, but much more slender; and if the colouring can be relied upon, the red passes further along the upper mandible, and the yellow further back upon the lower mandible, while the frontal shield is small. There is also no representation in either figure of the white markings of the flanks conspicuous in the common Gallinule, and which the artist could scarcely fail to have represented, had they existed in the specimens before him. Convinced, therefore, that a peculiar and distinct species is represented, we shall provisionally name it *GALLINULA BUENESII*.

Mr. Theobald has also presented nests of *OROLUS KUNDU*, *LANIUS HARDWICKII*, and *MUNIA MALABARICA*: of which last species he observed the curious fact of two pairs of birds constructing a single ordinary nest in common, within a few yards of his tent, where he was encamped for several months continuously; and from another nest of the same species he took the extraordinary number of 25 eggs!\* We are further indebted to him for eggs of the following species of birds:—*BUTEO CANESCENS* (*RUFINUS*?) ; *POLIOENIS TISA* ; *HALIAETUS MACULI*, *NEOPHRON PERCNOTERUS* ; *OXYLOPHUS MELANOLEUCOS* ; *CENTROPUS RUFIPENNIS* ; *CORVUS CORAX* (from Punjab Salt Range);† *C. ———* ? (Kashmir hills) ; *C. MONEDULA* (Kashmir) ; *ACHIDOTHERES TRISTIS* ; *MUNIA MALABARICA* ; *GALEBIDA CRISTATA* ; *MALACOCERCUS CAUDATUS* ; *LANIUS LAHTORA* ; *L. TEPHRONOTUS* ; *L. HARDWICKII* ; *THAMNOBIA CAMBAIENSIS* ; *PYCNONOTUS CAFER* ? (*bengalensis*) ; *P. HEMORRHOUS* ; *P. LEUCOTIS* ; *NECTARINIA ASIATICA* ; *TURTUR HUMILIS* ; *AMMOPERDIX BONHAMI* ; *CACCABIS CHUKAE* ; *PERDIX PONTICERIANA* ; *TURNIX OCELLATUS* ; *SARCIOPHORUS BILOBUS* ; *HEBODIAS BUBULCUS* ; *ARDEOLA LEUCOPTERA* ; *GALLINULA CHLOROPUS* (*BUENESII*?) ; *FULICA ATRA* (Kashmir) ; *DERDROCYGNA AWSUBEE* ; *NETTAPUS COROMANDELIANUS* ; *PODICEPS CRISTATUS* (Kashmir) ; *P. PHILIPPENSIS* ; and a few others, undetermined.

Of reptiles, Mr. Theobald has favored us with specimens of *CYTODACTYLUS MACULARIUS*, *n. s.*, from the Punjab Salt Range ; *GYMNODACTYLUS GECKOIDES* (*vide J. A. S. XXII*, 410), from ditto ; *HEMIDACTYLUS LESCHENAULTII*, D. and B., from ditto ; *STELLIO CYANOCASTER*, *Ruppell* (*vide J. A. S. XXII*, 646), from Kashmir ; *LAUDAKIA* (?) *MELANURA*, *n. s.*, Kashmir (?) ; *CHABASIA DORSALIS*, *Gray*, from Birblum ; *AGAMA*

\* According to Col. Sykes, this species (his *Lonchura cheet*) sometimes takes possession of the deserted nests of *PLOCEUS PHILIPPINUS* (or more probably of *PL. MANTAL*). *Proc. Zool. Soc.* 1832, p. 95.

† *Vide p.* 218, *ante*.

AGILIS, Olivier (*Trapelus flavimaculatus*, Ruppell, or a most closely affined species), from the Punjab Salt Range; CALOTES TRICARINATUS, (J. A. S. XXII, 652), Darjiling;\* ACANTHODACTYLUS VULGARIS, Dumeril and Bibron, Punjab Salt Range;† MOCOA SIKIMMENSIS (J. A. S. XXII, 652), Kashmir (!); EUREYLEPIS TENIOLATUS, n. s. et g., Punjab Salt Range; TORTRIX ERYX (*Eryx indica*, Gray), ditto; CALAMARIA FUSCA (J. A. S. XXIII, 288), Darjiling; CORONELLA CALLICEPHALUS, Gray (XXIII, 289), ditto; COLUBER VITTACAUDATUS, n. s., ditto; TROPIDONOTUS DIPAS, var.‡ (J. A. S. XXIII, 297), ditto; and VIPERA ECHIS, Ind. var. (remarkably fine), from the Punjab Salt Range.§

\* Several specimens are all of the same small size as the example originally described.

† Figured by Savigny, *Rept. d'Egypt, Supp.* pl. 1, f. 9.—N. B. The AC. NILGHERRIENSIS, Jerdon, J. A. S. XXII, 476, is an EREMIAS, Fitzinger.

‡ Almost plain blackish above, buffy-white below, with a lateral row of black spots,—one near the margin of each abdominal scuta, beginning from about a fourth of the entire length; a whitish V-like mark behind the occiput.

§ CYRTODACTYLUS MACULARIUS, nobis, n. s. Apparently affined to C. MAR. MORATUS, (Kuhl), of the Malay countries; with tail granular beneath, as in that species: scales on throat minute, becoming gradually larger to the abdomen. The very young have probably the crown black; a broad black band across the nape; two others upon the body, between the fore and hind-limbs; another where the hind-limbs are articulated; and three more upon the tail, besides its black tip: the inter-spaces being of a fine rosy-carneous hue, with a few black tubercles interspersed among the numerous pale tubercles: limbs and under-parts spotless, on the former slightly marked. In a specimen not half-grown, the interior of the black bands is pale and speckled with black, the margins continuing black; and it is probable that the dark hue ultimately disappears from the interior of the patches. In the specimen under examination, the dark hue appears to have almost left the crown, its blackish margin only remaining, as a streak from the nostril through the eye and continued round to join its opposite upon the occiput: crown and cheeks mottled with dark spots more or less confluent; and the interspace from the occiput to the nape-band has many black tubercles. The length of this young specimen (which had lost and renewed its tail-tip) is  $3\frac{1}{4}$  in. from snout to vent: but Mr. Theobald informs us that the species attains more than double the size, and when alive is remarkable for the beauty of its prevailing rosy-carneous hue. It probably attains the size of C. FULCHELLUS. From the Punjab Salt Range.

LAUDAKIA (?) MELANURA, nobis, n. s. A well marked second species of Dr. Gray's genus LAUDAKIA, founded on the AGAMA TUBERCULATA of Hardwicke's *Ill. Ind. Zool.*; if not, rather, a new genus affined to LAUDAKIA (in which case this may bear the name PLOCEDERMA, nobis). Head and body flat, or depressed: the tail more than twice the length of the head and body; and slender, except towards its base, where depressed and broad. Longest fore-toe reaching to the vent: longest hind-toe to the eye. Tympana large and round; their circum-

The occurrence of certain of these reptiles in Kashmir and upon the Punjab Salt Range is highly interesting; as especially *Gymnodactylus*

ference partly concealed by surrounding tuberculated plaits or folds. A glandulous pit above the shoulder, black within; and thence a small plait is continued back over the shoulder to the flank, where followed by another and smaller one; there is also a lateral fold or plait from fore to hind-limb, margining the abdominal surface. Two transverse folds on the throat; the anterior of which is a double or cross-fold: continued upward into a complication of sundry folds or plaits on the sides of the neck, and there are others above the axilla. A slight appearance of crest on the nape only. Head covered with smooth round or hexagonal scales, in general convex, flat upon the orbits, and obtusely keeled transversely upon the sinciput. Scales of the back imbricated, keeled; largest along the middle, and gradually smaller to the sides, where minute: those upon the tumid base of the tail very large, with prominent keels terminating each in a raised point; save on the under surface, where they are pointed but not keeled: the long slender portion of the tail is clad with similar but small scales: those on the upper and posterior surface of the limbs are keeled, with acute points, like those of the tail: and those of the lower-parts are small, hexagonal, and smooth. On the abdominal region is a patch of rather larger and glandulous scales, much less developed than in *L. TUBERCULATA*, and placed much lower down (nearer the hind-limbs) than in Hardwicke's published figure of that species: another and præ-anal patch of the same, not very distinct; but the vent is bordered with a ridge of minute scales anteriorly, and posteriorly with a crescent-like patch of the same, beyond which is a remarkable depression like a false vent. On the folds about the tympana, sides of the neck, and axillæ, also on some transverse folds upon the base of the hind-limbs posteriorly, and one above the base of the hind-limb on its dorsal aspect, are some rather larger and tubercular scales: but not any of these are interspersed over the body, as in *L. TUBERCULATA*. Colour (in spirit) olive-grey; probably olive-green and changeable when alive; the head and body speckled over with dark scales, and also with some scales paler than the rest: the long slender portion of the tail dusky black: and the lower-parts pale or buffy white, apparently suffused with crimson when alive; the throat and below the shoulders beautifully marbled with greyish-black, probably blue in the living animal. Entire length of specimen 11 in.; of which tail  $7\frac{1}{2}$  in.: and hind-limb  $2\frac{1}{2}$  in. Habitat uncertain; but believed to be Kashmir.

*EURYLEPIS*, nobis, n. g. Affined to *THYRUS*, Gray (founded on the *GONGYLUS OCELLATUS*, D. and B.) Body fusiform, depressed; with rather small limbs, five-toed, the first and fifth toe of the hind-foot short and the fourth longest. Tail longer than the head and body, cylindrical and evenly tapering. Head pyramidal; the scutation as figured by Savigny of his *Anolis pavé* (*Descr. Egypt., Nat. Hist., Rept. t. 4, f. 4, v. Scincus multiseriatus*, Cuv., *R. A., et Sc. pavimentatus*, Is. Geoff.; but undescribed by M. M. Dumeril and Bibron, who doubtfully identify it with *EUPREPIS SEPTENTENIATUS*, Reuss,—*Hist. Rept. v, 682*). Nostrils lateral, pierced in a small separate nasal scuta. A translucent disk to the lower eye-lid. Tympana sunk: the auditory orifice serrated anteriorly. Palatal incision

GECKOIDES, STELLIO CYANIGASTER, AGAMA AGILIS, and ACANTHODACTYLUS VULGARIS. Mr. Theobald's shells consist chiefly of well known species, and include a fine series of the Afghan BULIMUS SPELÆUS, Hutton, from the Salt Range.

E. BLYTH.

rather large. Two great pre-anal scales, obliquely separated. All the scales quite smooth, without trace of keels. A remarkable character consists in a series of very wide (but longitudinally narrow) scales along the middle of the back, continued from above the articulation of the fore to that of the hind-limbs; beyond which either way they are represented by an alternately double series, hexagonal, and similar to the scales on the other parts. There are two lateral series of dorsal scales on either side of the broad medial series; three additional series on the sides of the body; and eight abdominal series: all longitudinal. Along the middle of the tail underneath is also a series of broad scales, and ten other longitudinal series surrounding the tail. The scales of the upper-parts are conspicuously distinct apart; those of the under-parts less so. Scales upon the limbs smaller than the rest, but otherwise similar. No femoral pores.

EU. TENIOLATUS, nobis, n. s. Pale olive-grey above, with three pale-spotted dark bands more or less distinct, reaching backward as far as the hind-limbs; and the tail more or less speckled with dusky-black: under-parts spotless dull-white. In the young, these markings are much more intensely brought out: the medial dorsal band is less broad than the series of wide medial dorsal scales along which it runs, and also than the lateral bands; and the tail is brightly spotted throughout, except along its under surface. Length of adult 9 in., of which the tail (from vent) is  $5\frac{1}{2}$  in.; fore-limb  $\frac{3}{4}$  in., reaching to the fore-part of the eye; and hind-limb, 1 in.: distance from fore to hind-limb  $2\frac{3}{4}$  in. This handsome Scink is common in the Alpine Punjab.

COLUBER VITTACAUDATUS, nobis, n. s. Affined to C. FASCIOLATUS, Shaw. Vertical plate pentagonal, with obtuse posterior apex. A single frænal. Nineteen rows of scales. Abdominal scutæ, 220: caudal scutellæ, 95 pairs. Ground-colour olive, paler below: a broad black streak behind each eye, not continued on to the neck, and hardly shewing anterior to the eye: rest of head and neck without markings. Tail short, with four longitudinal black bands on a whitish ground: anterior to the vent, the upper band on each side becomes much broader, and is crossed with numerous pale striæ, more or less distinct; which, at about the second posterior fifth of the entire length of the animal, coalesce and unite to form a lateral pale band, more or less broken and continued forward to the neck: above and below this irregular pale band, are series of black elongated diamond squares, pale-centred excepting those towards the neck; the upper series of these squares uniting, each with its opposite, leave a series of lengthened oval pale spots along the middle of the back, continued (from about the third-fifth of the length of the animal) as an unbroken pale-band to the end of the tail. Lower-parts pale, mottled with black, resolving into two dark lines upon a pale ground, along the posterior two-fifths of the entire length. Length of specimen, 19 in.; of which tail,  $3\frac{1}{2}$  in. From the vicinity of Darjiling.

## LIBRARY.

The following additions have been made to the library since September last.

*Presented.*

Magnetical and Meteorological Observations made at the Hon'ble East India Company's Observatory, Bombay, in the year 1851. Bombay, 1854, 4to.—BY THE RIGHT HON'BLE THE GOVERNOR IN COUNCIL OF BOMBAY.

Parabole de l'enfant Egaré formant le chapetre IV. du Lotus de la Bonne Loi, Par P. E. Foucaux. Paris, 1854, 8vo.—BY THE AUTHOR.

Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen. Deel XXV.—BY THE BATAVIAN SOCIETY.

Natuurkundig Tijdschrift voor Nederlandsch Indie. Deel VI. Aflevering V. and VI.—BY THE SAME.

Tijdschrift voor Indische Taal,—Land,—en Volkenkunde, Jahrgang III.—BY THE SAME.

Anglo-Burmese Hand-Book, or a Guide to a practical knowledge of the Burmese language, compiled by Dr. A. Chase, Maulmein, 1852, oblong 12mo.—BY THE AUTHOR.

Lexicon Geographicum cui titulus est مرادد الاعلّاع على اسماء الامكنه و البقا octavum fasciculum, edidit T. G. J. Juynboil, Lugduni Batavorum 1854.—BY THE EDITOR.

Selections from the Records of the Government of the North Western Provinces, part XV.—BY THE GOVERNMENT OF THE N. W. P.

Selections from the Records of the Government of India (Home Dept.) No. V.—BY THE GOVERNMENT OF INDIA.

Ditto ditto, Foreign Department, No. IV.—BY THE SAME.

Report on the Revenue Administration of the Districts comprised in the Hazaribagh Division or South-West Frontier Agency, for 1851-52.—BY THE GOVERNMENT OF BENGAL.

A Short Account of the Ganges Canal.—BY LIEUT.-COL. W. E. BAKER.

Proceedings of the Royal Society, Vol. VII. No. 5.—BY THE SOCIETY.

The Upadeshak, No. 94.—BY THE EDITOR.

The Bibidhārtha Sangraha, No. 30.—BY THE EDITOR.

The Tattwabodhinī Patrikā, No. 133.—BY THE TATTWABODHINĪ SOBHA'.

The Calcutta Christian Observer, 1854.—BY THE EDITORS.

The Oriental Baptist, No. 94.—BY THE EDITOR.

The Oriental Christian Spectator, No. for September, 1854.—BY THE EDITOR.

The Citizen for August and September last.—BY THE EDITOR.

The Doorbeen, a Persian Newspaper, for September, 1854.—BY THE EDITOR.

*Exchanged.*

The Athenæum, for July, 1854.

The London, Edinburgh and Dublin Philosophical Magazine, No. 50.

The Calcutta Review, No. 45.

*Purchased.*

Journal des Savants, for July, 1854.

Comptes Rendus, Nos. 1 and 2, for July, 1854.

The Annals and Magazine of Natural History, No. 80.

Chúrnak, 12mo.

Casheenath's System of Logic, 8vo.

Neelratna's Bohoodarsan, 8vo.

Rammohun Roy's Bengali Grammar, 8vo.

Padúnka Duta, 12mo.

A'tmatattwa Vidyá, 12mo.

Morton's Proverbs, 8vo.

Hatem Tai, in Bengali, 4to.

Sháhnámeh, in Bengali, 4to.

RA'JENDRALÁ'L MITTRA.

FOR NOVEMBER, 1854.

At a meeting of the Asiatic Society held on the 1st inst. at half-past 8 P. M.

SIR JAMES COLVILLE, KT. President, in the Chair.

The minutes of the last month's proceedings were read and confirmed.

Presentations were received—

1. From the Imperial Academy of Sciences of Vienna, all the publications of the Academy (for detail, vide Library report).

2. From the Royal University of Christiania, all the publications of the University (for detail, vide Library report).

3. From Lt. Col. Baker on the part of R. M. Stephenson, Esq. managing director, E. I. Railway, the following specimens of iron ores, viz. (1) A specimen of coal from Natal, Cape of Good Hope; (2) Specimens of iron ore from Nagpoor, with a memorandum by the Rev. J. Hislop; (3) Specimens of iron and iron ore from the neighbourhood of Poona, &c. in Nimar, with a sample of the iron manufactured therefrom; (4) Specimens of iron and iron ore from near

Midnapore, with sample of the iron manufactured therefrom; (5) Specimens of iron ore and crude iron from 20 miles north of Doya on the More River, Beerbhoom.

4. From Lt.-Col. Baker, a plan of the town and ruins of Rajmahal, showing the site of the proposed Railway Terminus at that station.

5. From C. Grant, Esq. (1) a specimen of coal from Moukmeagnouth Colliery Pit, in Durham, (2) specimens of Shale with impressions of ferns, (3) specimens of embedded fresh water mussel, (4) an Ammonite from Whitby and (5) a specimen of iron stone from Dysart in Fifeshire.

The following gentlemen duly proposed and seconded at the last meeting were balloted for, and elected ordinary members.

G. H. Bushby, Esq. C. S. (re-elected).

F. A. Lushington, Esq. C. S. (ditto).

Dr. Boycott, Bombay Medical service.

Lt. N. W. Elphinstone, 4th Regt. N. I.

Lt. H. S. Bivar, 18th Regt. B. N. I.

The following were named for ballot at the next meeting.

G. G. Morris, Esq. C. S., Purneah, proposed by Mr. Grote, and seconded by the President.

Capt. G. H. Saxton, 38th M. N. I. proposed by Mr. Samuells and seconded by Dr. Spilsbury.

Bábu Kissory Chand Mittra, Junr. Magistrate, Calcutta, proposed by Bábu Ramgopaul Ghose and seconded by Bábu Rádánáth Sickdar.

Communications were received—

1. From Dr. Röer, enclosing a paper on the Bibliographical history of the Upanishads.

2. From the Government of the North Western Provinces, through Mr. Under-Secretary Carmichael, Meteorological Register kept at the Secretariat Office at Agra, for the month of September last.

3. From Major A. Cunningham, forwarding a paper entitled "Coins of Indian Buddhist Satraps with Greek Inscriptions."

The following is an extract from Major C.

"When I formerly told you that I thought I could give some information on points that would be interesting to your brother, I meant re-



garding Alexander the Great himself, and not about his successors. Two of these points you will find in the present paper; one about Porus being a descendant of Jajāti and therefore a *Paurava*, the other about the kings being *Murians*, which establishes the fact of Chandra Gupta being contemporaneous with Alexander the Great. I will now add three points in the Geography; 1st, *Shor-kat* (the capital of the Pergunnah of *Shor* in Akbar's time) was the ancient *Alexandria Sorianè*; 2nd, The Ravi formerly ran past Multan into the Chenab; in fact it completely encircled the Fort, which agrees with what is recorded by the Greeks of the metropolis of the Malli—'Alexander sailed round it.' The old bed is traceable the whole way from Serai Sidhu to Multan; 3rd, The Alexandria founded by Leonatus on the borders of Gedrosia was *Alexandria Melunè*; now Ras Malan on the sea coast.

"I have made some most beautiful discoveries regarding the early wanderings of the Solar and Lunar races, which will be rather startling perhaps at first, but they are nevertheless quite true. Their interest depends on the intimate connexion between them and the dominant races of the west. Thus the Thracians and Macedonians were descended from the same stock as the Afghans. This is not a conjecture, but a plain fact susceptible of *proof*. Suppose we should come upon some people in a distant country living on the banks of a 'River Thames' who called themselves 'men of Kent' and Kentish men, what would be the inference? The Afghans, as you are aware, call themselves *Pashtun* and *Pakhtun* (Pathun or Pathán) and they live on the river Indus or *Abi-sindh*! Now in Thrace there was a river called *Aψιδος*, on whose banks live the *Βιστωνιοι* from whom *Βειθωνοι* of Bothynia acknowledged their descent. Here then we have both *Beitun* and *Bistun* on the Assinthus River.

"This is one proof out of many. The Thracians and Bithynians had cities called *Nysa*, with the worship of Dionysus, as had also the people of the Kabul river. I have traced the connecting links of the chain from the Indus to the Atlantic, and I think that I can establish the migration of the Solar race through all the countries which they must have visited. Thus the *Kaspaturus* or Kas Pakturas of India re-appears in *Katapataka* (or Cappadocia) in *Karpathos* Insula, and in the Karpathee montes, or modern *Krapack*. This subject alone will require a single volume.

"But it is the religion, and not the Geography, that affords the most interesting illustrations. Thus Alexander's historians relate that Abbissares that is the king of *Sabissa* kept a huge dragon, and that Taxiles kept another, whose worship was similar to that of Dionysus. Remembering that Sabazios is a name of Dionysus; and that *Sabas* is the name of a snake in

the Alpine dialects of the Punjab, we see the connexion between Dionysus with his snakes in baskets and the god *Sabazias*; we see also how the Greek *σαβάζειν* was formed as it evidently meant to call out 'Shabash,' so also *ζεβες* &c. &c. as the priests of Baal called out "O Baal! hear us!" That snake-worship was formerly dominant in India, we all know, but no one has yet attempted to trace it. This I am now doing, but, before writing, I wish to read all that has been written upon snake-worship by European authors, not one of those that I have yet read, has even the faintest idea of its true origin. My illustrations on this subject are most complete, and they most unexpectedly point out the object of Stonehenge and the other stone circles of Britain."

The Librarian and the Curator of the Museum of Economic Geology submitted their usual monthly reports.

*Report of the Curator Museum of Economic Geology, November, 1854.*

I usually delay reporting upon contributions till I have examined them, but illness and the number of contributions, with many miscellaneous duties and calls, and some very long and intricate researches which I have been following out, have thrown me so much in arrears that I must unwillingly break through my custom and mention only many contributions which I could wish to have examined before doing so.

*Geology and Mineralogy.*—We have received a box of 45 specimens, mostly rocks, from the Coromandel Coast, by a Madras ship; but I have no notice from the donor, nor do I recognise the hand-writing. I have catalogued the localities but have not yet examined them.

We have also received from Mr. Blyth a bottle of Petroleum from Mooltan, also from an unknown donor.

Mr. Oldham's valuable contribution was exhibited at the October meeting, and it is described in the following letter by him.

From the Superintendent of the Geological Survey to the Secretary, Asiatic Society of Bengal.

*Dated 13th September, 1854.*

SIR,—I have the honor to forward herewith, for the Museum of Economic Geology some boxes of specimens both Geological and Palæontological, which will, I hope, be found valuable additions to its collections.

They consist principally of a fine collection of fossil plants from the Rajmahal hills.

Some rock specimens from ditto ditto.

Ditto ditto from Khasi Hills.

- . Iron ores and iron from ditto ditto.
- . Iron ore from Birbhoom.
- . Tin ore and tin from Tenasserim Provinces.
- . Iron ditto from Tavoy.
- . Coal from Namdang in Assam.

I have the honor to be, Sir,

Your most obedient servant,

(Signed) THOS. OLDHAM.

Mr. W. Theobald, Junior, has obliged us with a number of rock specimens from the Punjab, which are not yet examined, nor has any catalogue of them been received.

Major Ramsay, resident of Katmandoo has again obliged us by soliciting and obtaining from H. E. the Minister Jung Bahadoor some very handsome specimens of Nepaulite, with its melted ores, some of which is on the table, and a box of the products of a different mine, which will be examined and reported on in due time, as they require a careful investigation.

We have received from Captain W. S. Sherwill of the Revenue Survey a small Meteorite, of the fall of which, with a number of others, the following extract of a letter from him, gives an account.

"By to-day's Dawk Banghy, I have despatched to your address, and for presentation to the Asiatic Society's Museum, a tin case containing a small Aerolite that fell from the heavens near to the small Military station of Segowlee on the Katmandoo road, and 20 miles from the foot of the outer or lower Himalayas. It was given to me lately when I was at Moteeharee, which is near Segowlee, by Mr. F. A. Glover of the Civil Service, Joint-Magistrate of Chumparun, who also kindly gave me the following description of its fall.

"The stone or rather stones, for there were several, (I saw five or six) fell about mid-day of the 4th March, 1853, no noise accompanied their fall; nor were they *seen* falling; a man and a boy who were engaged in the fields were startled by hearing heavy thumps on the ground caused by the falling stones, they picked up the stones and brought them to their village,\* from whence they were taken by some of the Irregular Cavalry Sowars to Segowlee. The adjutant of the corps, Lieut. Macdougall gave me one large stone, and I procured two smaller ones (one of which I gave you) from the village near which they fell.'

"There seems to be no reasonable doubt but that the stones fell as

\* A small village a few miles South of Segowlee.—W. S. S.

stated, though this certainly rests on native testimony merely ; but in this case, no object could be gained by falsehood.

"The nearest rock to the spot is 20 miles in a northerly direction as the crow flies.

(Signed) " W. S. SHEEWILL."

*Patna, 24th November, 1854.*

The stone is undoubtedly a Meteorite, but we cannot afford to break this valuable little specimen to obtain a large fracture ; we can only then, judging from the small chips taken off, say that it greatly resembles Dr. Tytler's Meteorites which also fell with a great number of others near Allahabad some thirty or forty years ago.

#### ECONOMIC GEOLOGY.

Our acquisitions here are very numerous and rich, and one of them indeed probably of immense importance.

Captain Hannay's iron ores and paper on the history of iron in Assam have already been before the Society.

The Kumaon iron ores of Lt.-Col. Drummond with his memorandum, and those from Mr. Stephenson presented through Lt.-Col. Baker have been already brought forward at a late meeting.

Mr. Taylor of Burdwan has obliged as with some fine specimens of the iron ores of Burdwan.

Mr. Allen of the N. W. Dawk Company has sent for examination some supposed copper ore or *gossan* from the neighbourhood of Simla. It proves however to be a soft ferruginous shale without any trace of copper.

I said above that one of our acquisitions in this department is of immense importance ; and this will be understood when I say that, after some difficulty, I have at length procured through the kindness of Capt. Niblett of the H. C. Steamer *Sesostria*, a bag of the Ava coal which we some time ago saw announced in the newspapers, and that upon examination it proves to be a first rate Steam coal, equal to some of the best Welsh Steam coals, the Pont-y-pool and another, which it almost exactly resembles. I have been also able to ascertain from Major Burney's Ava specimens in our collection that the locality of this coal is the Kyendwen River which falls into the Irrawaddy a little above Yandaboo, about 200 miles from our frontier post Meaday ; for a Jet coal from that locality of which also Captain Niblett has brought us some very inferior specimens, was analysed by Mr. James Prinsep and of this there are also specimens in Major Burney's collection

but (probably from there being only one specimen of our fine bituminous looking coal) he has not analysed it; and it is a curious comment on the importance of the old collections, and those from distant countries, that at the distance of nearly a quarter of a century they should afford us not only this information, but also serve to put us on our guard when we attempt to pronounce on the value of the coal; for had only our inferior Jet coal been brought to us, we should have pronounced it as nearly worthless, which it is as a steam coal. Mr. Prinsep's jet coal will no doubt be found in time. Ours is probably a mere surface shale, though I can detect no organic remains.

The value of a really good steam coal, not only in Ava, but for all our sea-going steamers, whether public or private, I need not further remark upon.

H. PIDDINGTON.

The following additions have been made to the library since the October meeting.

*Presented.*

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, mathematisch-naturwissenschaftliche Classe, Band I. Band VI. 5 heft, Band VII. heft I. Band IX. hefts III. to V. Bands X. and XI. Band XII. hefts I. @ IV. and a vol. of plates.—BY THE IMPERIAL ACADEMY OF VIENNA.

Ditto ditto, philosophisch-historische Classe. Band I. Band VII. 1. and 2 hefts. Band IX. hefts III. @ V. Band X. and XI. and XII. heft I. to IV.—BY THE SAME.

Archiv für Kunde österreichischer Geschichtsquellen. Band I. @ XII.—BY THE SAME.

Fontes Rerum Austriacarum, Österreichische Geschichts-quellen, vols. I. to VII.—BY THE SAME.

Die Vegetationsverhältnisse von Iglau, von Alois Pokory. Wien, 1852, 8vo.—BY THE SAME.

Genera et Species Plantarum Fossilium, auctore F. Unger. Vindobonae, 1850, 8vo.—BY THE SAME.

Versuch einer Geschichte der Pflanzenwelt, von Dr. F. Unger. Wien, 1852, 8vo.—BY THE SAME.

Systema Helminthum, auctore C. M. Diesing, 2 vols. 8vo.—BY THE SAME.

Monumenta Habesburgica, vol. I.—BY THE SAME.

Erster Bericht über die zur Dampfschiffahrt geeigneten Stienkohlen

England's. Von Sir Henry de la Beche und Dr. Lyon Plaifair, 8vo.—By THE SAME.

Das Mosnisch-rabbinische Civilrecht bearbeitet von H. B. Fassel, vol. I. 8vo.—By THE SAME.

Monumenta Linguae Palaeoslovenicae e Codice suprasliensi edidit F. Miklosich, 1 vol. 8vo.—By THE SAME.

Entwurf eines Meteorologischen Beobachtungs systems für die österreichische Monarchie, von Carl Kreil.—By THE SAME.

Die Grotten und Höhlen von Adelsberg, Lueg, Planina und Laas. Von A. Schmidt, 1 vol. 8vo. with a vol. of plates.—By THE SAME.

Deutsche Gedichte des XI. und XII. Jahrhunderts, von J. Diemer. Wien, 1849, Rl. 8vo.—By THE SAME.

Notizenblatt, Boilage zum Archiv für Kunde österreichischerquellen, for 1851-52-53.—By THE SAME.

Die Kechua Sprache, von J. J. V. Tschudi, 2 vols. 8vo.—By THE SAME.

Almanach for 1851-52-53 and 54.—By THE SAME.

Die antiken Gold-und silber monumente des K. K. Münz und Antiken Cabinettes in Wien. Beschrieben von J. Arneth, folio 2 vols.—By THE SAME.

Die Alterthümer von Hallstatter Salzberg und Dessen Umgebung, von F. Simony, oblong folio.—By THE SAME.

Archæologische Analecten von J. Arneth, Wien, 1851, oblong folio.—By THE SAME.

Das Verbrüderungs Buch des stiftes S. Peter zu Salzburg von Th. G. V. Krujan, Wien, 1852, folio.—By THE SAME.

Denkschriften der Kaiserlichen Akademie der Wissenschaften, mathematisch-naturwissenschaftliche Classe, vols. IV. to VII.—By THE SAME

Ditto ditto philosophisch-historische Classe, IV.-V. Band.—By THE SAME.

Intigration der Linearen Differential Gleichungen mit constanen und veränderlichen co-efficienten von Dr. J. Petzval, 2 parts, 4to.—By THE SAME.

Tafeln zu dem Portrage; der Polygraphische Apparat der K. K. Hof, und Staatsdruckerrei zu Wien, 8vo. pamphlet.—By THE SAME.

Regesten zur Geschichte der Markgrafen und Herzoge österreichs aus dem House Babenberg, von Andreas von Meiller, 4to.—By THE SAME.

Statistiske Tabeller for Kongeriget Norge, udgivne efter Foranstaltning af Departementet for det Indre, Ellefte Rakke.—By THE ROYAL UNIVERSITY OF CHRISTIANIA.

Jury Institutionen af Munch Ræder, 2 Bonds, 2 hefte.—By THE SAME.

Olaf den Helliges Saga und Snorre Sturlasson, Christiania, 1853.—By THE SAME.

Nyt Magazin for Naturvidenskaberne. 5 Nos. for 1853.—By THE SAME.

Barlaams og Josaphats Saga, Christiania, 1851, 8vo.—By THE SAME.

Olaf Tryggvesöns Saga ved odd Munk, Christiania, 1853, 8vo.—By THE SAME.

Det Kongelige Norske Frederiks Universitets Aarsberetning, for 1851, 12mo.—By THE SAME.

Berzeichnik der Verlags und Commissions Artikel von Carl Wilhem Leske in Darmstadt.—By THE SAME.

Syphilisationsforsög foretagne af W. Boeck, Christiania, 1853, 12mo.—By THE SAME.

Bidrag til Pectini branchiernes Udviklings Historie af J. Koron og D. C. Danielsen, Bengen, 2 8vo. pamphlets.—By THE SAME.

Beretning om Kongeriget Norges økonomiske Tilstand i aarene, 1846-50, Christiania, 1853, 4to.—By THE SAME.

Norsk Lappisk Ordbog, Af Nils Vebe Stock flet, Christiania, 1852, 8vo.—By THE SAME.

Strengleikar eda Liðabok af R. Keyser og C. R. Unger, Christiania, 1850, 8vo.—By THE SAME.

Om den Spidalske Sygdom Elephantiasis Græcorum af C. W. Boeck, Christiania, 1842, 8vo.—By THE SAME.

Natuurkundig Tijdschrift voor Nederlandsch Indie, Deel VII.

Monographie des Guepes Sociales, on de la Tribudes Vespiens, Par de Saussure, Nos. 1, 3, 4, 6.—By THE AUTHOR.

Ethnology of the Indo-Pacific Islands, by J. R. Logan, 2 parts.—By THE AUTHOR.

The Indian Annals of Medical Science, No. III.—By THE EDITOR.

Report on the Revenue Administration of the Province of Assam, for 1851-52.—By THE GOVERNMENT OF BENGAL.

The Oriental Christian Spectator, for October, 1854.—By THE EDITOR.

The Mineral Waters of India, with some hints on spas and sanatoria. By J. McPherson, M. D.—By THE AUTHOR.

*Exchanged.*

Calcutta Review, No. 45.

*Purchased.*

Bhaktitawasāra, 1 vol. 8vo.

Kabiranjan, 1 vol. 12mo.

- Sarvajnyan Munjari, 1 vol. 12mo.  
 Golébakáwali, 1 vol. 12mo.  
 Gita Govinda, 1 vol. 8vo.  
 Ajnán Timiranáshaka, 1 vol. 8vo.  
 Chikitsáarnab, 1 vol. 8vo.  
 Chaitanya Sangita, 1 vol. 8vo.  
 Uddhabadúta, 1 vol. 8vo.  
 Iblisnáme, 1 vol. 8vo.  
 Nala Damayanti, 1 vol. 8vo.  
 Sárábali, 1 vol. 8vo.  
 Pákarájeswara, 1 vol. 8vo.  
 Párasya Itihása, 1 vol. 8vo.  
 Ananda Lahari, 1 vol. 8vo.  
 Káli Bilása, 1 vol. 8vo.  
 Purusha Parikshá, 1 vol. 8vo.  
 Batris-singhásan, 1 vol. 8vo.  
 Dandi Parba, 1 vol. 8vo.  
 Romeo and Juliet in Bengali, 1 vol. 12mo.  
 Kimiá Vidyá Sára, 1 vol. 12mo.  
 Saga-ullá, 1 vol. 8vo.  
 Satya Itihása Sára, 1 vol. 8vo.  
 Svadvinsat Bákhyan, 1 vol. 12mo.  
 Adbhuta Rámáyana, 1 vol. 12mo.  
 Sankar Sára, 1 vol. 8vo.  
 Cháhár-Durvesh, 1 vol. 8vo.

1st Nov., 1854.

RA'JENDRALAL MITTRA.

#### FOR DECEMBER, 1854.

The Society met on the 6th instant at half-past 8 p. m.

SIR JAMES COLVILE, Kt., President, in the Chair.

The minutes of the last month's proceedings were read and confirmed.

Presentations were received—

1. From Captain T. C. Dalton, Debrughur, Assam, 10 silver coins of the Patan Sultans of Bengal (vide proceedings for September last).
2. From Bábu Rádhánáth Sikdár, 2 copies of the Másaik Patriká, No. IV.



3. From Mons. G. A. Durand, General Secretary to the Imperial Academy of Sciences at Bordeaux, the Journal of the Society for 1853-54.

4. From H. Piddington, Esq. copy of an Essay on Agricultural Science as a branch of Native Education.

The following gentlemen, duly proposed and seconded at the last meeting, were balloted for and elected ordinary members.

G. G. Morris, Esq. C. S.

Capt. G. A. Saxton, 38th M. N. I.

Bábu Kissorychand Mittra.

The Chairman on behalf of the Council gave notice of their intention, at the next anniversary meeting, to propose the following modification of Rule 6.

“Candidates for admission as ordinary members may be proposed by any ordinary member who has received authority from the candidate to propose him, and must be seconded by another ordinary member. The proposal shall be laid,” &c. (the rest as in the old rule).

Read letters—

1. From Rev. J. Long, suggesting that the Society should recommend to the Government the propriety of preserving the ruins of Rajmahal from spoliation.

The following is an extract from Rev. J. Long's letter:

“The preservation of the most interesting part of the ruins of Rajmahal which was the capital of Bengal only two centuries ago, ‘the city of one hundred kings’ is a subject deserving the attention of the Asiatic Society, and in accordance with a despatch which the Court of Directors sent to this country nine years ago respecting the preservation of antiquarian objects.

“Rajmahal will be an important station of the Railway Company and as the space for railway works is limited there, it is to be feared that hereafter men ignorant of the past history of this country and looking on the ruins with a Benthamite eye may cast off all that would interest the love of the past as mere rubbish.

“On the principle that prevention is better than cure, it would be well if steps could be now taken to save some of these ‘landmarks on the sea of time.’ We have few ruins in the Lower Pro-

vinces to point out to the gaze of the tourist or antiquarian, and these ruins if kept in preservation would be hereafter very interesting to railway travellers and others."

The Secretary explained that a representation had already been made to the Lieut.-Governor on the subject by direction of the Council.

2. From Prof. Anger, Librarian of the German Oriental Society conveying thanks of the Society for Nos. 43 to 74 of the *Bibliotheca Indica*, and No. VII. of 1853 and I. of 1854 of the Journal.

3. From C. P. Carmichael, Esq. Assistant Secretary to the Government of the N. W. Provinces. Meteorological Register kept at the Secretariat office of the N. W. Provinces for the month of October, 1854.

4. From H. Piddington, Esq. submitting the following papers, viz. :—

1st. Examination and analysis of a jet coal from the banks of the Teesta River.

2nd. Ditto ditto, two specimens of coal from Ava.

The Curator of the Geological Department and the Librarian submitted reports of additions made in their respective Departments.

#### LIBRARY.

The additions to the library during the past month have been the following :—

#### *Presented.*

Life of Mohammad in Bengali, Calcutta, 1854, 8vo.—BY THE REV. J. LONG.

Selections from the Records of the Bengal Government, No. XVI. 2 copies.—BY THE GOVERNMENT OF BENGAL.

Joseph's Map of the Grand Trunk Road, 3rd Section, Agra to Ferozepore.—BY THE SAME.

Selections from the Records of Government of the North-Western Provinces, Part XVI.—BY THE GOVERNMENT OF THE N. W. PROVINCES.

Range of the Thermometer at Nynsee Tal, from 1st January to 31st December, 1853.—BY THE SAME.

Recueil des Actes de l'Academie des Sciences, Belles-lettres et Arts de Bordeaux, No. 1 for 1851-52 and Nos. 2, 3 and 4 of 1853.—BY THE ACADEMY.

Selections from the Public Correspondence of the Punjab Administration, No. IX. 4 copies.—BY THE PUNJAB ADMINISTRATION.

Report of the Revenue Administration of the Lower Provinces for the official year 1852-53.—BY THE GOVERNMENT OF BENGAL.

Astronomical Observations made at the Hon'ble the East India Company's Observatory at Madras; for 1848-52.—BY THE MADRAS GOVERNMENT.

Proceedings of the Royal Society, No. 6.—BY THE SOCIETY.

Māsika Patrikā, No. IV. 2 copies.—BY THE EDITORS.

The Oriental Baptist, No. 95-6.—BY THE EDITOR.

Upadeshak, Nos. 95-6.—BY THE EDITOR.

The Calcutta Christian Observer, No 180.—BY THE EDITORS.

The Oriental Christian Spectator, for Nov. 1854.—BY THE EDITOR.

The Bibidhārtha Saṅgraha, No. 31.—BY THE EDITOR.

*Purchased.*

The Annals and Magazine of Natural History for September, 1854.

Comptes Rendus, Nos. 5 to 10.

Dec. 6th, 1854.

RA'JENDRALA'L MITTREA.



**ABSTRACT STATEMENT**  
**OF**  
**RECEIPTS AND DISBURSEMENT**  
**OF THE**  
**ASIATIC SOCIETY,**  
**FOR**  
**THE YEAR, 1853.**

## STATEMENT

Dr. *Abstract Statement of Receipts and Disbursements of the*

## RECEIPTS.

## To MUSEUM.

|                                                                                                                                                                                                               |      |   |   |           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|---|-----------|
| Received from the General Treasury, amount of Government allowance authorized by the Court of Directors for the services of a Curator, from December, 1852, to November, 1853, at 250 Rs. per mensem, ... Rs. | 3000 | 0 | 0 |           |
| Ditto ditto for the preparation of Specimens of Natural History from ditto to ditto at 50 do.                                                                                                                 | 600  | 0 | 0 |           |
|                                                                                                                                                                                                               |      |   |   | 3,600 0 0 |

## To MUSEUM OF ECONOMIC GEOLOGY.

|                                                                                                                                                                                                  |      |   |   |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|---|-----------|
| Received from the General Treasury, amount of Government allowance authorized by the Court of Directors for the services of a Joint-Curator, from December, 1852, to November, 1853, at 250, ... | 3000 | 0 | 0 |           |
| Ditto for Establishment and Contingencies from ditto ditto, at 64, ...                                                                                                                           | 768  | 0 | 0 |           |
|                                                                                                                                                                                                  |      |   |   | 3,768 0 0 |

## To COMPOSITION FEE.

|                                      |     |   |   |         |
|--------------------------------------|-----|---|---|---------|
| Received from Sir James Colville,... | 500 | 0 | 0 |         |
|                                      |     |   |   | 500 0 0 |

## To CONTRIBUTION AND ADMISSION FEE.

|                                                                 |      |    |   |           |
|-----------------------------------------------------------------|------|----|---|-----------|
| Received from the Members amount of Quarterly Contributions,... | 7778 | 9  | 3 |           |
| Ditto ditto Admission Fees, ...                                 | 384  | 0  | 0 |           |
| Ditto ditto in Advance, ...                                     | 6    | 10 | 6 |           |
|                                                                 |      |    |   | 8,169 3 9 |

## To LIBRARY INCLUDING SALE OF ORIENTAL PUBLICATIONS:

|                                                                                                                                               |      |    |   |            |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------|----|---|------------|
| Received from Bābu Rājendralāl Mittra, Librarian and Assistant Secretary, by Sale of Miscellaneous Books, from January to December, 1853, ... | 1351 | 4  | 0 |            |
| Ditto ditto at Benares, ...                                                                                                                   | 433  | 0  | 0 |            |
| Ditto ditto by Sale of Bibliotheca Indica sold at the Library including Subscriptions to do.                                                  | 306  | 6  | 0 |            |
| Ditto ditto by Professor Hall at Benares, ...                                                                                                 | 85   | 15 | 6 |            |
| Ditto ditto by London Agents, £ 24-12-3 or ...                                                                                                | 246  | 2  | 0 |            |
|                                                                                                                                               |      |    |   | 2,422 11 6 |

## To JOURNAL.

|                                                                                                         |   |   |   |         |
|---------------------------------------------------------------------------------------------------------|---|---|---|---------|
| Received by Sale of the Society's Journal and Subscription to ditto from January to December, 1853, ... | 0 | 0 | 0 | 816 4 0 |
|---------------------------------------------------------------------------------------------------------|---|---|---|---------|

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Carried over,... 19,276 3 3

No. I.

*Asiatic Society, from the 1st of Jan. to 31st of Dec. 1853.*

Cr.

**DISBURSEMENTS.****By MUSEUM.**

|                                                                                                           |     |      |   |   |            |
|-----------------------------------------------------------------------------------------------------------|-----|------|---|---|------------|
| Paid Mr. Blyth's salary as Curator, from December 1852 to November 1853, being 12 months, at Rs. 250, ... | Rs. | 3000 | 0 | 0 |            |
| Ditto for House-rent ditto ditto at 40, ...                                                               |     | 480  | 0 | 0 |            |
| Ditto for Establishment at 45 ditto, ...                                                                  |     | 540  | 0 | 0 |            |
| Ditto charges for repairing the Verandah of the Taxidermists' room, ...                                   |     | 1    | 3 | 0 |            |
| Ditto Contingencies for preparing Specimens of Natural History, ...                                       |     | 241  | 8 | 3 |            |
|                                                                                                           |     |      |   |   | 4,262 11 3 |

**By MUSEUM OF ECONOMIC GEOLOGY.**

|                                                                                                                                   |      |    |   |            |
|-----------------------------------------------------------------------------------------------------------------------------------|------|----|---|------------|
| Paid Mr. H. Piddington's salary as Joint-Curator, from December 1852 to November 1853, being 12 months at 250 Rs. per mensem, ... | 3000 | 0  | 0 |            |
| Ditto Establishment ditto ditto, at 35 ditto, ...                                                                                 | 420  | 0  | 0 |            |
| Ditto Contingencies, ...                                                                                                          | 267  | 11 | 9 |            |
|                                                                                                                                   |      |    |   | 3,687 11 9 |

**By MUSEUM OF MINERALOGY AND GEOLOGY.**

|                                                                |   |    |   |        |
|----------------------------------------------------------------|---|----|---|--------|
| Paid Mr. H. Piddington, Curator, for Sundry Contingencies, ... | 4 | 13 | 0 | 4 13 0 |
|----------------------------------------------------------------|---|----|---|--------|

**By LIBRARY.**

|                                                                                                  |     |    |   |           |
|--------------------------------------------------------------------------------------------------|-----|----|---|-----------|
| Paid Babu Rajendralal Mittra's salary from December 1852 to November 1853, at 70 per mensem, ... | 840 | 0  | 0 |           |
| Ditto Establishment at 8, ditto, ...                                                             | 96  | 0  | 0 |           |
| Ditto Contingencies, ...                                                                         | 48  | 9  | 0 |           |
| Ditto for Binding Books, ...                                                                     | 225 | 11 | 0 |           |
| Ditto for Freight for Books dispatched to Benares, ...                                           | 23  | 5  | 9 |           |
| Ditto for Extra-writer for copying the Catalogue, ...                                            | 3   | 5  | 3 |           |
| Ditto for preparing Book-shelves, ...                                                            | 140 | 6  | 0 |           |
| Ditto for printing Catalogue, ...                                                                | 37  | 0  | 0 |           |
| Ditto for purchasing Books, ...                                                                  | 210 | 8  | 9 |           |
| Ditto for purchase of Books in London including duty, freight, &c. £37-10-6, ...                 | 375 | 4  | 0 |           |
|                                                                                                  |     |    |   | 2,000 1 9 |

**By JOURNAL.**

|                                                                                          |       |   |   |           |
|------------------------------------------------------------------------------------------|-------|---|---|-----------|
| Paid Rev. J. Thomas, of the Baptist Mission Press, for Journal up to No. 4, of 1853, ... | 1,861 | 8 | 6 |           |
| Ditto Sundry Draftsmen, Engravers, and Lithographers for Drawing, Engraving, &c. ...     | 1,505 | 4 | 0 |           |
| Ditto P. O. S. N. Company, freight for dispatching Journals to Europe, ...               | 89    | 5 | 0 |           |
| Ditto Contingencies, ...                                                                 | 40    | 3 | 6 |           |
|                                                                                          |       |   |   | 3,496 5 0 |

Carried over, ... 13,451 10 9

Brought forward, Co.'s Rs. 19,276 3 3

## To SECRETARY'S OFFICE.

Received fine from Chuprassee's wages, ... 0 12 0 0 12 0

## To DEPOSIT.

Received from Sir James Colville on account, ... 291 0 0

Received from J. Walker on account, ... 24 0 0  
315 0 0

## To DADOBA PANDURANG, Esq.

Received from him (by transfer), ... 31 0 0 31 0 0

## To J. BENNETT, Esq.

Received from him (by transfer), ... 306 1 4 306 1 4

## To F. E. HALL, Esq.

Received from him on account, ... 4 13 0 4 13 0

Carried over, ... 19,933 13 7

1854.]

*Proceedings of the Asiatic Society.*

v

Brought forward, Co.'s Rs. 13,451 10 9

## BY BUILDING.

|                                                                                                                         |       |   |   |            |
|-------------------------------------------------------------------------------------------------------------------------|-------|---|---|------------|
| Paid R. Ghose, Esq. Collector, Assessment for the premises of the Asiatic Society from November 1852, to July 1853, ... | 262   | 8 | 0 |            |
| Ditto H. M. Smith, Esq. for repairing the Society's premises, and building a new portico and a sky-light, ...           | 1,171 | 3 | 6 |            |
|                                                                                                                         |       |   |   | 1,433 11 6 |

## BY SECRETARY'S OFFICE.

|                                                                                          |       |    |   |           |
|------------------------------------------------------------------------------------------|-------|----|---|-----------|
| Paid General Establishment from December 1852, to November 1853, at 86-8 per mensem, ... | 1,038 | 0  | 0 |           |
| Ditto Secy.'s ditto from ditto ditto, ...                                                | 652   | 12 | 6 |           |
| Ditto Stationery, &c.,... ..                                                             | 27    | 9  | 0 |           |
| Ditto Postage,... ..                                                                     | 123   | 6  | 0 |           |
| Ditto Petty Charges, ... ..                                                              | 30    | 1  | 6 |           |
| Ditto for Printing and Lithographing Sundry blank forms, ... ..                          | 29    | 4  | 0 |           |
|                                                                                          |       |    |   | 1,906 1 0 |

## BY DEPOSIT.

|                                                                                         |    |   |   |        |
|-----------------------------------------------------------------------------------------|----|---|---|--------|
| Paid for drawing on stone, in Chalk Style, a Monk's-head, on account of Mr. Hodgson,... | 6  | 0 | 0 |        |
| Ditto for copying Sundry Books and purchasing papers on account of Lt. Raverty, ...     | 26 | 0 | 0 |        |
|                                                                                         |    |   |   | 32 0 0 |

## BY MISCELLANEOUS.

|                                                                             |     |    |   |         |
|-----------------------------------------------------------------------------|-----|----|---|---------|
| Paid Sundry Contingencies, charges for Meeting and oil for night-guard, ... | 183 | 13 | 3 |         |
| Ditto for Advertising Meetings of the Society, ...                          | 63  | 3  | 0 |         |
| Ditto J. Chaunce, for winding the clock, ...                                | 25  | 0  | 0 |         |
| Ditto Messrs. Augier & Co. for repairing a bronzed lustre, ...              | 2   | 8  | 0 |         |
| Ditto Rev. J. Thomas, for executing Miscellaneous Works, ... ..             | 27  | 8  | 0 |         |
|                                                                             |     |    |   | 302 0 3 |

## BY SIR JAMES COLVILLE.

|                                |     |   |   |         |
|--------------------------------|-----|---|---|---------|
| Paid him (by transfer,) ... .. | 791 | 0 | 0 | 791 0 0 |
|--------------------------------|-----|---|---|---------|

## BY GOVERNMENT AGENT.

|                                                                         |     |   |   |         |
|-------------------------------------------------------------------------|-----|---|---|---------|
| Paid him to purchase Government paper on account of the Society, ... .. | 500 | 0 | 0 | 500 0 0 |
|-------------------------------------------------------------------------|-----|---|---|---------|

## BY DADOBA PANDURANG, ESQ.

|                                |    |   |   |        |
|--------------------------------|----|---|---|--------|
| Paid him (by transfer,) ... .. | 31 | 0 | 0 | 31 0 0 |
|--------------------------------|----|---|---|--------|

## CONTRIBUTION.

|                                                                                                           |    |   |   |        |
|-----------------------------------------------------------------------------------------------------------|----|---|---|--------|
| Refunded M. J. Sandes, Esq. on account of H. Torrens, Esq. excess contribution for the 4 qr. 1852, ... .. | 16 | 0 | 0 | 16 0 0 |
|-----------------------------------------------------------------------------------------------------------|----|---|---|--------|

Carried over,... 18,463 7 6



Brought forward, Co.'s Rs. 19,933 13 7

## To BALANCE.

As per account closed on the 31st December,

|                                               |              |   |    |
|-----------------------------------------------|--------------|---|----|
| 1852, Cash in hand and at the Bank, ...       | 2,748        | 6 | 10 |
| Ditto with London Agents, £101-8-0, or at 21, | 1,014        | 0 | 0  |
|                                               | <u>3,762</u> | 6 | 10 |

## To GOVERNMENT AGENT.

|                                               |            |   |   |
|-----------------------------------------------|------------|---|---|
| To a piece of Government paper as per contra, | 500        | 0 | 0 |
|                                               | <u>500</u> | 0 | 0 |

|           |               |          |          |
|-----------|---------------|----------|----------|
| Co.'s Rs. | <u>24,196</u> | <u>4</u> | <u>5</u> |
|-----------|---------------|----------|----------|

Brought forward, Co.'s Rs. 18,463 7 6

## BY BALANCE.

|                                    |     |     |       |    |                  |
|------------------------------------|-----|-----|-------|----|------------------|
| In the Bank of Bengal,             | ... | ... | 3,911 | 11 | 5                |
| Cash in hand,                      | ... | ... | 99    | 11 | 5                |
| With London Agents £88-9-9 or,     | ... | ... | 884   | 14 | 0                |
| Invested in Government Securities, | ... | ... | 500   | 0  | 0                |
|                                    |     |     |       |    | <hr/> 5,396 4 10 |

## INEFFICIENT BALANCE.

|                                          |     |     |     |    |                            |
|------------------------------------------|-----|-----|-----|----|----------------------------|
| Due by H. M. Smith, Esq.                 | ... | ... | 200 | 0  | 0                          |
| Ditto, ditto Lieut. Raverty,             | ... | ... | 21  | 8  | 10                         |
| Ditto, ditto E. Blyth, Esq.              | ... | ... | 82  | 2  | 0                          |
| Ditto, ditto R. N. Cust, Esq.            | ... | ... | 1   | 8  | 0                          |
| Ditto, ditto H. Templeton, Esq.          | ... | ... | 1   | 8  | 0                          |
| Ditto, ditto Petty Charges for December, | ... | ... | 29  | 13 | 3                          |
|                                          |     |     |     |    | <hr/> 336 8 1              |
|                                          |     |     |     |    | <hr/> Co.'s Rs. 24,196 4 5 |

E. E.

(Signed)

RA'JENDEBALA'L MITTRA,  
*Assistant Secretary.*

STATEMENT

*Dr. The Oriental Publication Fund to*

## 1853.—TO CUSTODY OF ORIENTAL WORKS.

|                                                                                                                                                 |     |   |   |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----|---|---|-----------|
| Paid Bábu Rájendralál Mittra, his salary for the Custody of Oriental Works from December, 1852, to November, 1853, at 30 Rs. per mensem, ... .. | 360 | 0 | 0 |           |
| Ditto Establishment for ditto ... ..                                                                                                            | 144 | 0 | 0 |           |
| Ditto Book-binding, ... ..                                                                                                                      | 54  | 0 | 0 |           |
| Ditto Contingencies for ditto, ... ..                                                                                                           | 12  | 6 | 6 |           |
| Ditto Govind Mistry for three Glazed Cases, ... ..                                                                                              | 760 | 0 | 0 |           |
| Ditto Messrs. Lackersteen & Co. 8 Wrought Iron Clamps with screws, &c. for Book-shelves, ... ..                                                 | 35  | 0 | 0 |           |
|                                                                                                                                                 |     |   |   | 1,365 6 6 |

## TO BIBLIOTHECA INDICA.

|                                                                           |   |   |   |          |
|---------------------------------------------------------------------------|---|---|---|----------|
| Paid Dr. E. Roër, his salary and Establishment for December, 1852, ... .. | 0 | 0 | 0 | 161 14 0 |
|---------------------------------------------------------------------------|---|---|---|----------|

## TO LALITA VISTARA.

|                                                                             |    |   |   |         |
|-----------------------------------------------------------------------------|----|---|---|---------|
| Paid Bábu Rájendralál Mittra, editing charges on account, ... ..            | 42 | 0 | 0 |         |
| Ditto Rev. J. Thomas for printing No. 51, of the Bibliotheca Indica, ... .. | 69 | 0 | 0 |         |
|                                                                             |    |   |   | 111 0 0 |

## TO HISTORY OF CHINA.

|                                                                                                     |   |   |   |         |
|-----------------------------------------------------------------------------------------------------|---|---|---|---------|
| Paid J. Corcoran, Esq. for 20 copies of the 2nd vol. of his Urdu History of China, per bill, ... .. | 0 | 0 | 0 | 240 0 0 |
|-----------------------------------------------------------------------------------------------------|---|---|---|---------|

## TO SA'NĒYA PRAVACHANA BHĀ'SHYA.

|                                                                                              |   |   |   |       |
|----------------------------------------------------------------------------------------------|---|---|---|-------|
| Paid Agents of the Inland Transit Company hire on a parcel sent to Benares, per bill, ... .. | 0 | 0 | 0 | 7 7 0 |
|----------------------------------------------------------------------------------------------|---|---|---|-------|

## TO DICTIONARY OF TECHNICAL TERMS.

|                                                             |     |   |   |          |
|-------------------------------------------------------------|-----|---|---|----------|
| Paid Moulouvie Mohammed Wajeeh for postage per bill, ... .. | 13  | 8 | 0 |          |
| Ditto ditto, ... ..                                         | 11  | 4 | 0 |          |
| Ditto Abdul Hoqq for copying MSS. ... ..                    | 180 | 0 | 0 |          |
| Ditto Mohammadee for ditto, ... ..                          | 14  | 6 | 1 |          |
| Chummu peon, his salary for 22 days of Oct....              | 1   | 9 | 6 |          |
|                                                             |     |   |   | 220 11 7 |

## TO BLACK YAJUR SANHITA.

|                                     |     |   |   |         |
|-------------------------------------|-----|---|---|---------|
| Paid Dr. E. Roër on account, ... .. | 165 | 0 | 0 |         |
| Ditto for Paper, ... ..             | 0   | 6 | 0 |         |
|                                     |     |   |   | 165 6 0 |

## TO ITQUAN.

|                                                                                     |     |   |   |         |
|-------------------------------------------------------------------------------------|-----|---|---|---------|
| Paid Moneeruddeen for copying MSS. ... ..                                           | 12  | 0 | 0 |         |
| Ditto Rev. J. Thomas for printing Nos. 44 and 49, of the Bibliotheca Indica, ... .. | 444 | 0 | 0 | 456 0 0 |

Carried over, ... 2,727 13 1

1854.]

*Proceedings of the Asiatic Society.*

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No. 2.

*Account Current with the Asiatic Society.*

Cr.

**By BALANCE.**

|                             |     |       |     |       |                    |
|-----------------------------|-----|-------|-----|-------|--------------------|
| In Company's Paper with Go- |     |       |     |       |                    |
| vernment Agent, ...         | Rs. | 7,000 | 0   | 0     |                    |
| Cash in their hands,        | ... | 1,077 | 15  | 10    |                    |
|                             |     |       |     |       | 8,077 15 10        |
| Bank of Bengal, ...         | ... | ...   | ... | 1,397 | 15 3               |
| Cash in hand, ...           | ... | ...   | ... | 37    | 11 9               |
|                             |     |       |     |       | <u>9,513 10 10</u> |

**By GOVERNMENT GRANT.**

|                                                                                                                                                                                     |     |     |   |   |   |       |   |   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|---|---|---|-------|---|---|
| Received from the General Treasury, being the monthly grant sanctioned by the Court of Directors from December, 1852. to November, 1853, being twelve months at 500 Rs. per mensem, | ... | ... | 0 | 0 | 0 | 6,000 | 0 | 0 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|---|---|---|-------|---|---|

**By LOAN.**

|                                   |     |  |  |  |  |   |   |    |
|-----------------------------------|-----|--|--|--|--|---|---|----|
| Received from the Society's Cash, | ... |  |  |  |  | 6 | 7 | 11 |
|-----------------------------------|-----|--|--|--|--|---|---|----|

---

 Carried over,... 15,520 2 9

Brought forward, Co.'s Rs. 2,727 13 1

## To KHIED NAMEH ISKANDARY.

|                                                                                                                       |     |   |   |     |   |   |
|-----------------------------------------------------------------------------------------------------------------------|-----|---|---|-----|---|---|
| Paid Rev. J. Thomas, for printing No. 43 of the Bibliotheca Indica, containing the first fasciculus of the above, ... | 256 | 0 | 0 | 256 | 0 | 0 |
|-----------------------------------------------------------------------------------------------------------------------|-----|---|---|-----|---|---|

## To PURCHASE of MSS.

|                                                                |   |   |   |     |   |   |
|----------------------------------------------------------------|---|---|---|-----|---|---|
| Paid Ensign Lees, for a copy of a Commentary on the Koran, ... | 0 | 0 | 0 | 100 | 0 | 0 |
|----------------------------------------------------------------|---|---|---|-----|---|---|

## To CHAITANYA NA'TAK.

|                                                                                 |     |   |   |     |   |   |
|---------------------------------------------------------------------------------|-----|---|---|-----|---|---|
| Paid Bábu Rájendralál Mitra, editing charges on account, ...                    | 100 | 0 | 0 |     |   |   |
| Ditto Rev. J. Thomas, for printing Nos. 47 & 48, of the Bibliotheca Indica, ... | 435 | 4 | 0 |     |   |   |
|                                                                                 |     |   |   | 535 | 4 | 0 |

## To BIOGRAPHICAL DICTIONARY.

|                                                           |    |    |   |    |   |   |
|-----------------------------------------------------------|----|----|---|----|---|---|
| Paid Abdul Ghani for copying MSS. ...                     | 30 | 0  | 0 |    |   |   |
| Ditto Mohammadee for ditto, ...                           | 5  | 13 | 1 |    |   |   |
| Ditto Golam Kadir for ditto, ...                          | 35 | 0  | 0 |    |   |   |
| Ditto Keramut Ullah for ditto, ...                        | 0  | 12 | 0 |    |   |   |
| Ditto Chummu peon, his salary for 22 days of October, ... | 1  | 9  | 6 |    |   |   |
| Ditto Postage, ...                                        | 15 | 2  | 0 |    |   |   |
|                                                           |    |    |   | 88 | 4 | 7 |

## To SA'HITYA DARPANA.

|                                                               |     |   |   |     |   |   |
|---------------------------------------------------------------|-----|---|---|-----|---|---|
| Paid Rev. J. Thomas for Nos. 53-54-55 of the Bib. Indica, ... | 666 | 0 | 0 | 666 | 0 | 0 |
|---------------------------------------------------------------|-----|---|---|-----|---|---|

## To ISHA, &amp;c. UPANISHAD.

|                                                       |     |   |   |     |   |   |
|-------------------------------------------------------|-----|---|---|-----|---|---|
| Paid Mr. MacArthur for No. 50 of the Bib. Indica, ... | 245 | 0 | 0 | 245 | 0 | 0 |
|-------------------------------------------------------|-----|---|---|-----|---|---|

## To UTTARA NAISHADA.

|                                                                                                                                                      |       |    |   |       |    |   |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----|---|-------|----|---|
| Paid Rev. J. Thomas, cost for printing, Nos. 40, 42, 45, 46, 52, and 56 of the Bibliotheca Indica, being fasciculi 2 & 3 of the Uttara Naishada, ... | 1,338 | 0  | 0 |       |    |   |
| Ditto Dr. E. Roër, editing charges on account current, ...                                                                                           | 315   | 13 | 0 |       |    |   |
|                                                                                                                                                      |       |    |   | 1,653 | 13 | 0 |

## To BLACK YAJUR BRA'HMANA.

|                                                              |    |   |   |    |   |   |
|--------------------------------------------------------------|----|---|---|----|---|---|
| Paid Bábu Rájendralál Mitra, on account editing charges, ... | 70 | 0 | 0 |    |   |   |
|                                                              |    |   |   | 70 | 0 | 0 |

## To BALANCE.

|                                                |       |    |    |       |   |   |
|------------------------------------------------|-------|----|----|-------|---|---|
| Company's paper with the Government Agent, ... | 7,000 | 0  | 0  |       |   |   |
| Cash with ditto, ...                           | 1,077 | 15 | 10 |       |   |   |
| Balance in the Bank of Bengal, ...             | 817   | 0  | 3  |       |   |   |
|                                                |       |    |    | 8,895 | 0 | 1 |

## To INEFFICIENT BALANCE.

|                                   |     |   |   |     |   |   |
|-----------------------------------|-----|---|---|-----|---|---|
| Due by Sariat Wollah Duftory, ... | 20  | 0 | 0 |     |   |   |
| Ditto Petambur Paul, ...          | 263 | 0 | 0 | 283 | 0 | 0 |

Company's Rupees, 15,520 2 9

1854.]

*Proceedings of the Asiatic Society.*

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Brought forward, Co.'s Rs. 15,520 0 1

Company's Rupees, 15,520 0 1

Q

## STATEMENT No. 3.

| ASSETS.                                                                          |                   | LIABILITIES.                                                                             |                  |
|----------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------|------------------|
| Cash in hand, .....                                                              | Rs. 5,232 12 11   | Due to Sir James Colvile, .....                                                          | Rs. 291 8 0      |
| Amount of outstandings on account of contribu-<br>tion and admission fees, ..... | 6,437 7 5         | Ditto, to J. W. Laidlay, Esq., .....                                                     | 418 7 4          |
| Ditto, on account subscription to the Journal, ..                                | 1,772 12 0        | Ditto, Dr. A. Sprenger, .....                                                            | 6 10 6           |
| Ditto, on account sale of ditto, .....                                           | 285 8 0           | Ditto, F. E. Hall, Esq., .....                                                           | 4 13 0           |
| Ditto, on account sale of books, .....                                           | 393 4 0           | Ditto, J. Walker, Esq., .....                                                            | 24 0 0           |
| Ditto, on account Bibliotheca Indica, .....                                      | 309 14 0          | Ditto, Mr. Smith on account of new beams, ....                                           | 500 0 0          |
| Ditto, from the Batavian Society of Arts and<br>Sciences, .....                  | 83 1 9            | Ditto, Rev. J. Thomas, for Nos. V. VI. and VII.<br>of the Journal for 1853, about, ..... | 700 0 0          |
| Ditto, from Lieut. Raverly, .....                                                | 21 9 0            |                                                                                          |                  |
| Ditto, from B. H. Hodgson, Esq., .....                                           | 1 8 0             |                                                                                          |                  |
| Company's Paper, .....                                                           | 500 0 0           |                                                                                          |                  |
|                                                                                  | <hr/> 15,037 13 1 |                                                                                          | <hr/> 1,945 6 10 |

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Ishri Prosád, Raja.

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Lieut.-Col. C. H. Rawlinson, Persia.

*Meteorological Observations kept at Rangoon.*

(1)

*Abstract of Meteorological Observations for the month of May, 1853.*

*Rangoon, 1st June, 1853.*

| Thermometer<br>Sunrise. | Thermometer<br>9 A. M. |          |                                           | Thermometer<br>Noon. |          |                                           | Thermometer<br>3 P. M. |          |                                           | Thermometer<br>Sunset. |          |                                           | Thermometer<br>9 P. M. |          |                                           | Remarks.                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|------------------------|----------|-------------------------------------------|----------------------|----------|-------------------------------------------|------------------------|----------|-------------------------------------------|------------------------|----------|-------------------------------------------|------------------------|----------|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | Maximum.               | Minimum. | Min. of pre-<br>ceding ob-<br>servations. | Maximum.             | Minimum. | Min. of pre-<br>ceding ob-<br>servations. | Maximum.               | Minimum. | Min. of pre-<br>ceding ob-<br>servations. | Maximum.               | Minimum. | Min. of pre-<br>ceding ob-<br>servations. | Maximum.               | Minimum. | Min. of pre-<br>ceding ob-<br>servations. |                                                                                                                                                                                                                                                                                                                                                                              |
| Wet....                 | 80.6                   | 79       | 78.450                                    | 81.5                 | 75       | 78.896                                    | 83.5                   | 76.5     | 79.5                                      | 83                     | 75       | 78.4                                      | 88                     | 74       | 77.388                                    | The weather this month has been un-<br>settled, cloudy and frequently wet ;<br>squalls of wind and rain with light-<br>ning at sunset and during the night.<br>Prevailing winds in early part of the<br>month in the mornings W. N. W.<br>S. W. or W. S. W. in the afternoon.<br>Latterly prevailing in the S. W.<br>Up to sunrise of 1st June, 80.4 inches<br>of rain fell. |
|                         |                        |          | 76.7d4                                    |                      |          |                                           |                        |          |                                           |                        |          |                                           |                        |          |                                           |                                                                                                                                                                                                                                                                                                                                                                              |
| Dry....                 |                        | 74.5     | 78.450                                    |                      | 75.5     | 90.914                                    | 101.5                  | 79       | 91.130                                    | 87                     | 77       | 83                                        | Barometer<br>9 P. M.   | 75       | 81.281                                    | Barometer<br>9 P. M.                                                                                                                                                                                                                                                                                                                                                         |
|                         |                        |          |                                           |                      |          |                                           |                        |          |                                           |                        |          |                                           |                        |          |                                           |                                                                                                                                                                                                                                                                                                                                                                              |
| No<br>instru-<br>ment.  | 30.094                 | Maximum. |                                           | 30.09                | Maximum. |                                           | 30.04                  | Maximum. |                                           | 30.1d                  | Maximum. |                                           | 30.05                  | Maximum. |                                           | Barometer<br>9 P. M.                                                                                                                                                                                                                                                                                                                                                         |
|                         | d9.91                  | Minimum. | d9.815                                    | d9.92                | Minimum. | d9.847                                    | d9.80                  | Minimum. | d9.717                                    | d9.89                  | Minimum. | d9.761                                    | d9.80                  | Minimum. | d9.774                                    |                                                                                                                                                                                                                                                                                                                                                                              |
|                         |                        |          |                                           |                      |          |                                           |                        |          |                                           |                        |          |                                           |                        |          |                                           |                                                                                                                                                                                                                                                                                                                                                                              |

J. PAYNE, M. D. Asst. Surgeon,  
Field Hospital, Rangoon.

Rangoon, 1st June, 1853.

| Date.  | SUNRISE.     |       |                 |                                    |                   | 9 A. M. |              |         |                 |                                    | NOON.             |              |         |                 |                                    |                   |
|--------|--------------|-------|-----------------|------------------------------------|-------------------|---------|--------------|---------|-----------------|------------------------------------|-------------------|--------------|---------|-----------------|------------------------------------|-------------------|
|        | Thermometer. |       | Mer-<br>curial. | Force and<br>direction of<br>Wind. | Aspect of<br>Sky. | Rain.   | Thermometer. |         | Baro-<br>meter. | Force and<br>direction of<br>Wind. | Aspect of<br>Sky. | Thermometer. |         | Baro-<br>meter. | Force and<br>direction of<br>Wind. | Aspect of<br>Sky. |
|        | Wet.         | Dry.  |                 |                                    |                   |         | Wet.         | Dry.    |                 |                                    |                   | Wet.         | Dry.    |                 |                                    |                   |
| 1      | 77           | 79    | 29.72           | W.N.W.lt.                          | Clear.            | ..      | 78.5         | 89.5    | 29.80           | W.S.W.f.                           | †                 | 78           | 99      | 29.80           | W.S.W.f.                           | Cumuli.           |
| 2      | 78           | 80    | 29.78           | Ditto                              | Ditto             | ..      | 79           | 90      | 29.85           | Ditto lt.                          | Ditto             | 80           | 97.5    | 29.82           | S.W. do.                           | Ditto             |
| 3      | 77           | 79.5  | 29.80           | Ditto                              | Ditto             | ..      | 79           | 88      | 29.864          | W.S.W.f.                           | †                 | 79           | 98      | 29.78           | S.W. lt.                           | Cumuli.           |
| 4      | 76           | 78.5  | 30.79           | Ditto                              | Ditto             | ..      | 78.5         | 89.5    | 29.822          | S.W. f.                            | Clear.            | 76           | 99      | 29.832          | W.S.W.lt.                          | Scid.lt.cum.      |
| 5      | 76           | 79    | 29.72           | Ditto                              | Ditto             | ..      | 77           | 87      | 29.83           | W.S.W.lt                           | Cumuli.           | 77.5         | 99      | 29.83           | w.s.w.std.                         | Ditto             |
| 6      | 75.5         | 79    | 29.78           | Calm.                              | Foggy.            | ..      | 78           | 85      | 29.84           | Ditto                              | \$                | 76.5         | 97.5    | 29.84           | Ditto                              | Lt fleecy c.      |
| 7      | 76           | 78.5  | 30.27           | Ditto                              | Lt. cirri.        | ..      | 78           | 87.5    | 29.90           | Ditto                              | Ditto             | 78           | 96.5    | 30.77           | Ditto                              | Ditto             |
| 8      | 75.5         | 74.5  | 29.77           | ....                               | ....              | ..      | 78.5         | 85.5    | 29.84           | Ditto                              |                   | 81.5         | 97.5    | 29.763          | S.W. fog.                          | Ditto             |
| 9      | 74.5         | 77.5  | 29.78           | ....                               | Clear.            | 0.56    | 77           | 84      | 29.84           | S.W. lt.                           | Clear.            | 78.5         | 90.5    | 29.82           | S. lt. [able.                      | Do. strati.       |
| 10     | 74.5         | 77.5  | 29.81           | ....                               | ....              | 0.22    | 78           | 82      | 29.84           | S. lt.                             | Cdy. & cl.        | 78.5         | 90.5    | 29.81           | N. change-                         | Ditto             |
| 11     | 78           | 80    | 29.78           | W.S.W.                             | Cum.-st.          | ..      | 79           | 85.5    | 29.84           | S.W. lt.                           | Clear.            | 79           | 95.5    | 29.792          | S. by E. do.                       | Ditto             |
| 12     | 76           | 78    | 29.72           | S.b.W.lt.                          | Cumuli.           | ..      | 77.5         | 83      | 29.78           | Ditto                              | Ditto             | 78           | 95      | 29.75           | S.W. lt.                           | ....              |
| 13     | 77           | 79    | 29.73           | ....                               | Clear.            | ..      | 79.5         | 85      | 29.78           | Ditto                              | Ditto             | 81           | 76      | 29.74           | Ditto                              | Sirri.            |
| 14     | 76.5         | 79    | 29.72           | ....                               | ....              | ..      | 79           | 83.5    | 29.76           | Ditto                              | Cirri.            | 77.5         | 97      | 29.75           | S. by E. lt.                       | Cum. hazy.        |
| 15     | 78           | 80.5  | 29.71           | ....                               | ....              | ..      | 79           | 84      | 29.77           | Ditto                              | Ditto st.         | 81.5         | 96      | 29.74           | N.W. lt.                           | ....              |
| 16     | *            | 75    | 29.71           | ....                               | ....              | 1.80    | 74.5         | 75      | 29.76           | ....                               | ....              | 75           | 73.5    | 29.71           | Ditto                              | ....              |
| 17     | 74.5         | 75    | 29.71           | N.W.lt.                            | ....              | 1.20    | 74.5         | 75      | 29.76           | N.E. lt.                           | Strati.           | 75           | 73.5    | 29.71           | Ditto                              | Strati. Rain.     |
| 18     | 75           | 75.5  | 29.69           | Ditto                              | ....              | 1.70    | 76           | 77      | 29.72           | N.W. lt.                           | Ditto             | 77           | 78.5    | 29.70           | Ditto                              | Ditto             |
| 19     | 74.5         | 76    | 29.70           | Ditto                              | ....              | 0.05    | 79           | 81.5    | 29.75           | Ditto.                             | Cumuli.           | 80.5         | 89.5    | 29.752          | Ditto                              | Cumuli.           |
| 20     | 78.5         | 80    | 29.74           | Calm.                              | ....              | ..      | 79           | 86.5    | 29.81           | Ditto.                             | Ditto             | 79           | 85.5    | 29.79           | W.N.W.lt.                          | Circo-strati.     |
| 21     | 78.5         | 80    | 29.788          | Ditto                              | ....              | ..      | 80           | 85      | 29.822          | W.S.W.                             | Cumuli.           | 80           | 91.5    | 29.82           | ....                               | Cumuli.           |
| 22     | 78           | 79.5  | 29.81           | S.W. lt.                           | Cirri.            | ..      | 80           | 85.5    | 29.87           | Ditto                              | Ditto             | 79           | 92      | 29.82           | Ditto                              | A few scatd.      |
| 23     | 78           | 79.5  | 29.824          | Ditto                              | Ditto             | ..      | 81           | 86      | 29.87           | Ditto                              | Ditto             | 80           | 90.5    | 29.856          | W.S.W.lt.                          | .. [cum.          |
| 24     | 79           | 80.5  | 29.81           | Ditto                              | Cirri.-st.        | 0.05    | 81           | 83.5    | 29.85           | Ditto                              | Ditto             | 82           | 89      | 29.84           | Ditto                              | Cum. strati.      |
| 25     | 77           | 78.5  | 29.82           | W.S.W.lt.                          | Ditto             | 0.05    | 80           | 83      | 29.88           | Ditto                              | Ditto             | 77           | 80      | 29.84           | Ditto                              | Ditto             |
| 26     | 77           | 78    | 29.78           | Ditto                              | Ditto             | 0.05    | 79           | 80      | 29.82           | S.W. lt.                           | Strati.           | 77           | 79      | 29.78           | W.N.W.lt.                          | Strati. Rain.     |
| 27     | 76           | 77    | 29.74           | Ditto                              | Ditto             | 0.35    | 79           | 81      | 29.80           | Ditto                              | Cumuli.-st.       | 78           | 90      | 29.78           | Ditto                              | Ditto             |
| 28     | 77           | 79    | 29.76           | Ditto                              | Cirri.-cum.       | .06     | 80.5         | 84.5    | 29.80           | Ditto                              | Cr.-cumuli        | 81           | 90      | 29.78           | ....                               | Cumuli.           |
| 29     | 77           | 79    | 29.79           | Ditto                              | Ditto             | ..      | 78.5         | 83      | 29.82           | Ditto                              | Ditto             | 81           | 90      | 29.89           | Ditto                              | Ditto             |
| 30     | 76.5         | 77.5  | 29.88           | S.W. lt.                           | Cumuli.-st.       | 1.10    | ..           | ..      | ..              | ....                               | ....              | 80           | 85      | 29.78           | W. f.                              | Ditto             |
| 31     | 77           | 78    | 29.74           | W.S.W.lt.                          | Circo-st.         | .05     | 80           | 82      | 29.80           | Ditto                              | Ditto             | 78           | 81      | 29.77           | Ditto                              | Cum. strati.      |
| Total. | 222.5        | 235.5 | 894.452         | ....                               | ....              | 7.24    | 228.3        | 244.2.5 | 863.626         | ....                               | ....              | 223.8        | 265.6.5 | 864.985         | ....                               | ....              |
| Mean.  | 76.724       | 78.45 | 29.815          | ....                               | ....              | ..      | 78.724       | 84.224  | 29.781          | ....                               | ....              | 78.8966      | 90.914  | 29.827          | ....                               | ....              |

\* No observation. † Clear a few light cumuli rising in S.W. ‡ Clear a few light fleecy cumuli S.W. § Clear a few light cirri. || Cumuli scat'd. over sky.

\* No observation. † Clear a few light cumuli rising in S. W. ‡ Clear a few light fleecy cumuli S. W. § Clear a few light cirri. || Cumuli scat'd. over sky.

(3)

*Meteorological Remarks for the month of May, 1853—(Continued.)*

| 3 P. M.      |        |            |                              | SUNSET.        |              |      |            | 9 P. M.                      |                   |      |      | Remarks. |
|--------------|--------|------------|------------------------------|----------------|--------------|------|------------|------------------------------|-------------------|------|------|----------|
| Thermometer. |        | Barometer. | Force and direction of Wind. | Aspect of Sky. | Thermometer. |      | Barometer. | Force and direction of Wind. | Aspect of Sky.    |      |      |          |
| Wet.         | Dry.   |            |                              |                | Wet.         | Dry. |            |                              |                   | Wet. | Dry. |          |
| 79           | 101.5  | 29.73      | S. W. lt.                    | Cumuli.        | ..           | ..   | 29.58      | S. W. lt.                    | Clear.            | a    |      |          |
| 80           | 100    | 29.75      | S. W. steady.                | Ditto          | ..           | ..   | .79        | W. N. W.                     | Clear steady.     | b    |      |          |
| 78           | 101.5  | 29.74      | S. W.                        | Ditto          | ..           | ..   | ..         | ..                           | ...               | c    |      |          |
| ..           | ..     | ..         | ..                           | ..             | ..           | ..   | ..         | ..                           | ...               | d    |      |          |
| 76.5         | 101    | 29.72      | S. W. fog.                   | Sq. cum.       | ..           | ..   | .78        | ..                           | ...               | e    |      |          |
| 79           | 100    | 29.766     | Ditto                        | Cumuli.        | ..           | ..   | .85        | ..                           | ...               | f    |      |          |
| 80.5         | 88.5   | 29.58      | Ditto                        | Ditto          | 29.78        | 87   | .83        | S. W. lt.                    | Clear.            | g    |      |          |
| 83           | 96.5   | 29.81      | Ditto                        | Ditto          | .73          | 81.5 | .82        | Ditto                        | Ditto.            | h    |      |          |
| 79.5         | 97.5   | 29.71      | S. by W. lt.                 | Ditto          | .75          | 81   | .78        | Ditto                        | Sqs. lfg. & rain. | i    |      |          |
| 78           | 92.5   | 29.77      | W. N. W. lt.                 | Ditto          | ..           | ..   | .84        | S. E. f.                     | Clear.            | j    |      |          |
| 80           | 93.5   | 29.71      | S. S. E. f.                  | Ditto          | .71          | 85   | .72        | S. lt.                       | Cumuli strati.    | k    |      |          |
| 81.5         | 97.5   | 29.646     | Ditto                        | Ditto          | ..           | ..   | .74        | Ditto                        | Clear.            | l    |      |          |
| 83.5         | 99.5   | 29.67      | S. E. lt.                    | Cumuli.        | ..           | ..   | .76        | ..                           | Cumuli-strati.    | m    |      |          |
| 82.5         | 97     | 29.64      | Ditto                        | Ditto          | ..           | ..   | .77        | S. W. f.                     | Cumuli.           | n    |      |          |
| ..           | 75.5   | 29.64      | ..                           | ..             | .68          | 90   | .71        | N. b. W. lt.                 | Strati.           | o    |      |          |
| 77           | 80.5   | 29.64      | S. W. lt.                    | Cumuli.        | .67          | 76   | .69        | Ditto                        | Ditto.            | p    |      |          |
| 80           | 92     | 29.67      | S. by E.                     | Den. clds.     | .87          | 81.5 | .75        | Ditto                        | Ditto.            | q    |      |          |
| 82.5         | 91.5   | 29.72      | S. W.                        | Cirri-st.      | ..           | ..   | .81        | S. W. lt.                    | Cirri-strati.     | r    |      |          |
| 83           | 93     | 29.766     | Ditto                        | Cumuli.        | ..           | ..   | .83        | Ditto                        | Cumuli-strati.    | s    |      |          |
| 81           | 93.5   | 29.78      | Ditto                        | Ditto          | ..           | ..   | .85        | Ditto                        | Cirri-strati.     | t    |      |          |
| ..           | ..     | ..         | N. W.                        | Den. clds.     | ..           | ..   | .82        | Ditto                        | Clear.            | u    |      |          |
| 83           | 89     | 29.80      | S. W. lt.                    | Strati.        | .90          | 77   | ..         | ..                           | ...               | v    |      |          |
| 77.5         | 81     | 29.76      | S. lt.                       | Cirri-st.      | ..           | ..   | .76        | S. W. lt.                    | Cumuli-strati.    | w    |      |          |
| 77           | 79.5   | 29.68      | ..                           | ..             | ..           | ..   | .78        | Ditto                        | Cirri-cumuli.     | x    |      |          |
| 78.5         | 83     | 29.714     | ..                           | ..             | 76           | 83   | .80        | Ditto                        | Ditto             | y    |      |          |
| 79           | 84     | 29.704     | S. W. lt.                    | Cumuli.        | ..           | ..   | .81        | Ditto                        | Ditto             | z    |      |          |
| 79           | 83.5   | 29.72      | Ditto                        | Ditto          | ..           | ..   | .79        | Ditto                        | Ditto             | z    |      |          |
| 77           | 79     | 29.70      | Ditto                        | Ditto          | ..           | ..   | .76        | Ditto                        | Ditto             | z    |      |          |
| 77           | 79     | 29.72      | Ditto                        | C. cum.        | ..           | ..   | .78        | Ditto                        | Clear.            | y    |      |          |
| 2146.5       | 2460.5 | 802.356    | ...                          | ..             | 267.85       | 747  | 744.39     | 2032                         | ..                |      |      |          |
| 79.5         | 91.130 | 29.717     | ...                          | ..             | 29.761       | 83   | 77.38      | 8128                         | ..                |      |      |          |

\* See next page.



*Meteorological Remarks for the month of May, 1853.*

- 
- a* Cool fresh air from W. N. W.
  - b* Lt. fleecy clouds.
  - c* Cool fresh air.
  - d* Cool fresh light, almost calm.
  - e* Cool breeze.
  - f* Sky free from clouds.
  - g* Strong breeze.
  - h* Scattered cumuli.
  - i* Wind variable.
  - j* No rain to-day.
  - k* Light breeze.
  - l* Close and sultry.
  - m* 1.8 Fell last night during above 1 hour and a half.
  - n* Heavy rain. Rain just ceased fallen for 4 hours.
  - o* Rain just ceased, fair.
  - p* Dense clouds. Fair and less clouds.
  - q* Fine but close. Close and sultry scattered cumuli.
  - r* Very sultry, fine breeze, cumuli and light air.
  - s* Hazy, scattered cumuli.
  - t* Ditto.
  - u* Ditto.
  - v* Dense clouds—rain.
  - w* Fine morning, light air.
  - x* Heavy rain after mid-night, rain.
  - y* Fine breeze.
- 

The weather this month has been unsettled, cloudy and frequently wet.

Squalls of wind and rain with lightning at sunset and during the nights.

Prevailing winds in the early part of the month in the morning W. N. W. S. W. and W. S. W. in the afternoons. Latterly prevailing throughout the 24 hours in the S. W.

Up to sunrise of 1st June .04 inches of rain have fallen.

The Barometer is by J. Newman 122, Regent St. London.

Cap. action + .046.

Capacities 1-58.

Temp. 32° Farh.

Neut. point 29532.

Height of Mercury from the ground six feet.

(5)

*Rangoon, 9<sup>th</sup> July, 1853.*

| Thermometer<br>Sunrise. | Thermometer<br>9 A. M.                    | Thermometer<br>Noon.                      | Thermometer<br>3 P. M.                    | Thermometer<br>Sunset.                    | Thermometer<br>9 P. M.                    | Remarks.                                                                                                                                                                                                                 |
|-------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bulbs.                  | Maximum.                                  | Maximum.                                  | Maximum.                                  | Maximum.                                  | Maximum.                                  | Prevailing winds this month South and<br>S. W. cloudy weather with fresh<br>breezes and frequent rain. 15.01<br>inches fell on 26 days.<br>The heaviest falls were on the 3d, 7th,<br>15th, 24th, and 30th of the month. |
|                         | Minimum.                                  | Minimum.                                  | Minimum.                                  | Minimum.                                  | Minimum.                                  |                                                                                                                                                                                                                          |
|                         | Min. of pre-<br>ceding ob-<br>servations. | Min. of pre-<br>ceding ob-<br>servations. | Min. of pre-<br>ceding ob-<br>servations. | Min. of pre-<br>ceding ob-<br>servations. | Min. of pre-<br>ceding ob-<br>servations. |                                                                                                                                                                                                                          |
| Wet....                 | 78.278                                    | 76.963                                    |                                           |                                           | 79.363                                    |                                                                                                                                                                                                                          |
|                         |                                           |                                           |                                           |                                           | 77.932                                    |                                                                                                                                                                                                                          |
| Dry....                 | 83                                        | 76                                        | 77.5                                      | 78                                        | 77                                        |                                                                                                                                                                                                                          |
|                         |                                           | 81.5                                      | 75.5                                      | 78                                        | 79.5                                      |                                                                                                                                                                                                                          |
|                         |                                           | 89.5                                      | 83                                        | 82                                        | 82                                        |                                                                                                                                                                                                                          |
|                         |                                           | 83.3704                                   | 82.46                                     | 80                                        | 79.363                                    |                                                                                                                                                                                                                          |
|                         |                                           | 79.8619                                   | 79.24                                     | 77.125                                    |                                           |                                                                                                                                                                                                                          |
| Barometer<br>Sunrise.   | Barometer<br>9 A. M.                      | Barometer<br>Noon.                        | Barometer<br>3 P. M.                      | Barometer<br>Sunset.                      | Barometer<br>9 P. M.                      |                                                                                                                                                                                                                          |
|                         | Maximum.                                  | Maximum.                                  | Maximum.                                  | Maximum.                                  | Maximum.                                  |                                                                                                                                                                                                                          |
|                         | Min. of pre-<br>ceding ob-<br>servations. | Min. of pre-<br>ceding ob-<br>servations. | Min. of pre-<br>ceding ob-<br>servations. | Min. of pre-<br>ceding ob-<br>servations. | Min. of pre-<br>ceding ob-<br>servations. |                                                                                                                                                                                                                          |
| 29.85                   | 29.66                                     | 29.726                                    | 29.51                                     | 29.61                                     | 29.55                                     |                                                                                                                                                                                                                          |
|                         |                                           | 29.64                                     |                                           |                                           |                                           |                                                                                                                                                                                                                          |
| 29.748                  | 29.791                                    | 29.814                                    | 29.715                                    | 29.84                                     | 29.81                                     |                                                                                                                                                                                                                          |
|                         |                                           |                                           |                                           |                                           |                                           |                                                                                                                                                                                                                          |
|                         |                                           |                                           |                                           |                                           |                                           |                                                                                                                                                                                                                          |

**J. FAYRE, M. D. Asst. Surgeon,  
Field Hospital, Rangoon.**

*Meteorological Observations for the month of June, 1853.*

(6)  
*Rangoon, 1st July, 1853.*

| SUNRISE. |              |        |            |                                    |                   |           |              |        |                                    | 9 A. M.           |               |         |                                    |                   |              |              |                                    |                   |  | NOON. |  |  |  |  |  |  |  |  |  |
|----------|--------------|--------|------------|------------------------------------|-------------------|-----------|--------------|--------|------------------------------------|-------------------|---------------|---------|------------------------------------|-------------------|--------------|--------------|------------------------------------|-------------------|--|-------|--|--|--|--|--|--|--|--|--|
| Date.    | Thermometer. |        | Me-<br>an. | Force and<br>direction of<br>Wind. | Aspect of<br>Sky. | R.<br>in. | Thermometer. |        | Force and<br>direction of<br>Wind. | Aspect of<br>Sky. | Thermometer.  |         | Force and<br>direction of<br>Wind. | Aspect of<br>Sky. | Thermometer. |              | Force and<br>direction of<br>Wind. | Aspect of<br>Sky. |  |       |  |  |  |  |  |  |  |  |  |
|          | Wet.         | Dry.   |            |                                    |                   |           | Wet.         | Dry.   |                                    |                   | Wet.          | Dry.    |                                    |                   | Wet.         | Dry.         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 1        | 77           | 78     | 29.81      | Cirro-strati.                      | S. W. lt.         | 0.80      | 80.5         | 83     | 29.848                             | S. W. lt.         | Cum. strati.  | 79      | 80.5                               | 29.804            | S. W. lt.    | Cumuli.      |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 2        | 78           | 79     | 29.76      | ....                               | ....              | 0.22      | 80           | 82     | 29.806                             | ....              | ....          | 79      | 80                                 | 29.756            | ....         | Strati.      |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 3        | 76.5         | 77     | 29.67      | ....                               | ....              | 1.04      | 79           | 81     | 29.73                              | ....              | ....          | 80.5    | 85                                 | 29.680            | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 4        | 76.5         | 77     | 29.60      | Cirro-strati.                      | ....              | 0.35      | 77           | 79     | 29.66                              | ....              | ....          | 79.5    | 86                                 | 29.64             | ....         | Cumuli.      |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 5        | 79           | 80.5   | 29.61      | Cum. strati.                       | S. W. lt.         | 0.25      | 81           | 85     | 29.68                              | S. by W. lt.      | Cum. strati.  | 79      | 81                                 | 29.64             | S. W. lt.    | Cum. strati. |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 6        | 77           | 78.5   | 29.65      | Strati.                            | Ditto             | 0.94      | 78           | 81     | 29.682                             | ....              | ....          | 81.5    | 83                                 | 29.68             | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 7        | 77           | 78.5   | 29.72      | ....                               | ....              | 0.96      | 78           | 80     | 29.78                              | W. N. W.          | Strati.       | 77      | 78                                 | 29.77             | ....         | Strati.      |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 8        | 77           | 78     | 29.78      | ....                               | ....              | 0.80      | 79.5         | 80     | 29.824                             | W. S. W. lt.      | ....          | 81      | 83                                 | 29.83             | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 9        | ..           | ..     | ..         | ....                               | ....              | .35       | 79           | 80     | 29.80                              | ....              | ....          | 81      | 84                                 | 29.78             | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 10       | 78.5         | 80     | 29.72      | ....                               | Cloudy.           | .10       | 80           | 82.5   | 29.78                              | ....              | ....          | 81      | 85                                 | 29.738            | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 11       | 80           | 80.5   | 29.76      | Calin.                             | ....              | .05       | 81.5         | 82     | 29.79                              | ....              | Cumuli.       | 81      | 89.5                               | 29.77             | S. W. stdy.  | Cumuli.      |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 12       | 81           | 83     | 29.83      | Cirro-Cum.                         | Hazy.             | .00       | 82           | 85     | 29.86                              | ....              | Cirro-strati. | 81.5    | 82                                 | 29.83             | Ditto lt.    | Cum. strati. |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 13       | 77           | 77     | 29.81      | S. W. lt.                          | Strati.           | .55       | 79.5         | 79.5   | 29.89                              | ....              | ....          | 80.5    | 82.5                               | 29.84             | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 14       | ..           | ..     | 29.78      | ....                               | Cumuli.           | .00       | 78           | 81     | 29.84                              | ....              | ....          | 80      | 82                                 | 29.79             | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 15       | 78           | 80     | 29.78      | ....                               | Strati.           | .10       | 80           | 82     | 29.84                              | ....              | ....          | 81.5    | 88                                 | 29.73             | S. W. lt.    | Cumuli       |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 16       | 78.5         | 80     | 29.78      | ....                               | ....              | .60       | 79           | 82     | 29.83                              | ....              | ....          | 80.5    | 85.5                               | 29.82             | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 17       | 77           | 78     | 29.78      | ....                               | ....              | .10       | 78           | 79     | 29.78                              | ....              | ....          | 79.5    | 82.5                               | 29.74             | ....         | Strati.      |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 18       | 77.5         | 79.5   | 29.78      | S. E. lt.                          | Cirro-st.         | .30       | 78           | 80.5   | 29.80                              | Steady.           | Strati.       | 80.5    | 84.5                               | 29.814            | S. W. fog.   | Ditto        |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 19       | 76.5         | 78     | 29.84      | ....                               | ....              | 1.75      | 77.5         | 79     | 29.86                              | ....              | Cumuli.       | 80.5    | 84.5                               | 29.83             | Ditto lt.    | Cum. strati. |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 20       | 75           | 76     | 29.85      | S. W. lt.                          | Rain.             | .45       | 77.5         | 79     | 29.88                              | ....              | Cumuli.       | 79.1    | 87                                 | 29.82             | Ditto lt.    | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 21       | 79           | 80     | 29.81      | ....                               | ....              | .32       | 80           | 83     | 29.84                              | ....              | ....          | 81      | 85                                 | 29.81             | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 22       | 75           | 78     | 29.78      | ....                               | ....              | .00       | 79           | 82     | 29.82                              | ....              | ....          | 80      | 84                                 | 29.78             | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 23       | 78           | 79     | 29.76      | ....                               | ....              | .90       | 79           | 81     | 29.81                              | ....              | ....          | 76      | 77.5                               | 29.77             | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 24       | 74           | 76     | 29.72      | ....                               | ....              | 1.20      | 77           | 80     | 29.78                              | ....              | ....          | 78      | 83                                 | 29.68             | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 25       | 75           | 77     | 29.69      | S. W. lt.                          | Cumuli.           | 0.12      | 77           | 81     | 29.72                              | W. N. W.          | Cumuli.       | 78      | 84                                 | 29.73             | ....         | Cumuli.      |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 26       | ..           | ..     | ..         | ....                               | ....              | 0.00      | 78           | 81.5   | 29.74                              | ....              | Cirri.        | 78      | 82                                 | 29.76             | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 27       | 75           | 76     | 29.77      | S. W. lt.                          | ....              | 0.50      | 75           | 77     | 29.78                              | ....              | Strati.       | ..      | ..                                 | ..                | ....         | Strati.      |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 28       | 75.5         | 78     | 29.70      | ....                               | ....              | 0.10      | 77.5         | 80.5   | 29.74                              | ....              | ....          | ..      | ..                                 | ..                | ....         | Ditto        |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 29       | 74.5         | 75.5   | 29.67      | ....                               | Cum. st.          | 0.54      | ..           | ..     | ..                                 | ....              | ....          | ..      | ..                                 | ..                | ....         | Ditto        |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| 30       | 75           | 75.5   | 29.72      | ....                               | ....              | 1.62      | 75.5         | 76.5   | 29.77                              | S. W. lt.         | Strati.       | 80      | 82.5                               | 29.77             | S. W. lt.    | Ditto        |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| Total.   | 1978         | 2113.5 | 832.93     | ....                               | ....              | 15.01     | 22.81        | 234.5  | 863.94                             | ....              | ....          | 21.56   | 22.51                              | 802.602           | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |
| Mean.    | 76.963       | 78.278 | 29.748     | ....                               | ....              | 50.034    | 78.655       | 80.862 | 29.791                             | ....              | ....          | 79.8619 | 83.3704                            | 29.736            | ....         | ....         |                                    |                   |  |       |  |  |  |  |  |  |  |  |  |

\* No observations.

*Meteorological Observations for the month of June, 1853—(Continued.)*

(7)

| 3 P. M.      |  |      |  |  |                              |  |      |  |  | SUNSET.        |  |      |  |  |              |  |      |  |  | 9 P. M.                      |  |      |  |  |                |  |      |  |  |              |  |      |  |  |                              |  |      |  |  |                |  |      |  |  |          |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      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 |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      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| Thermometer. |  |      |  |  | Force and direction of Wind. |  |      |  |  | Aspect of Sky. |  |      |  |  | Thermometer. |  |      |  |  | Force and direction of Wind. |  |      |  |  | Aspect of Sky. |  |      |  |  | Thermometer. |  |      |  |  | Force and direction of Wind. |  |      |  |  | Aspect of Sky. |  |      |  |  | Remarks. |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  |  |      |  |      |  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*Meteorological Remarks for the month of June, 1853.*

Prevailing winds this month South and S. W. cloudy weather with fresh breezes and frequent rain 15.01 inches having fallen in 26 days.

The heaviest falls on the 3d, 7th, 15th, 24th, and 31st of the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of December, 1853.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tem-<br>perature. |      |       |
|-------|-------------------------------------------------|-------------------------|---------|---------|-------------------------------|--------------------------------|------|-------|
|       |                                                 | Max.                    | Min.    | Diff.   |                               | Max.                           | Min. | Diff. |
|       | Inches.                                         | Inches.                 | Inches. | Inches. | o                             | o                              | o    | o     |
| 1     | 29.968                                          | 30.041                  | 29.906  | 0.135   | 69.3                          | 80.2                           | 57.3 | 22.9  |
| 2     | .985                                            | .064                    | .942    | .122    | 68.9                          | 78.8                           | 57.0 | 21.8  |
| 3     | 30.022                                          | .103                    | .973    | .130    | 69.2                          | 78.3                           | 58.0 | 20.3  |
| 4     | <i>Sunday.</i>                                  |                         |         |         |                               |                                |      |       |
| 5     | 29.958                                          | .027                    | .894    | .133    | 67.7                          | 78.2                           | 55.5 | 22.7  |
| 6     | .952                                            | .040                    | .876    | .164    | 67.3                          | 79.0                           | 54.8 | 24.2  |
| 7     | .966                                            | .043                    | .913    | .130    | 67.0                          | 78.6                           | 58.5 | 20.1  |
| 8     | .981                                            | .057                    | .905    | .152    | 66.4                          | 77.0                           | 54.0 | 23.0  |
| 9     | .975                                            | .043                    | .913    | .130    | 64.4                          | 74.7                           | 51.4 | 23.3  |
| 10    | 30.003                                          | .081                    | .928    | .153    | 65.9                          | 76.0                           | 51.7 | 24.3  |
| 11    | <i>Sunday.</i>                                  |                         |         |         |                               |                                |      |       |
| 12    | .010                                            | .090                    | .947    | .143    | 68.3                          | 78.4                           | 56.5 | 21.9  |
| 13    | .004                                            | .089                    | .947    | .142    | 68.1                          | 78.5                           | 56.0 | 22.5  |
| 14    | .019                                            | .107                    | .957    | .150    | 68.6                          | 79.0                           | 56.6 | 22.4  |
| 15    | .025                                            | .113                    | .975    | .138    | 68.3                          | 79.0                           | 55.6 | 23.4  |
| 16    | .020                                            | .091                    | .965    | .126    | 68.4                          | 78.9                           | 56.0 | 22.9  |
| 17    | .037                                            | .113                    | .973    | .140    | 68.0                          | 79.0                           | 55.8 | 23.2  |
| 18    | <i>Sunday.</i>                                  |                         |         |         |                               |                                |      |       |
| 19    | 29.993                                          | .085                    | .930    | .155    | 65.4                          | 76.4                           | 53.0 | 23.4  |
| 20    | .987                                            | .066                    | .926    | .140    | 64.5                          | 77.0                           | 51.0 | 26.0  |
| 21    | .992                                            | .069                    | .930    | .139    | 64.2                          | 76.0                           | 50.9 | 25.1  |
| 22    | 30.053                                          | .126                    | .985    | .141    | 65.0                          | 76.7                           | 50.9 | 25.8  |
| 23    | .071                                            | .158                    | 30.008  | .150    | 66.3                          | 77.0                           | 53.9 | 23.1  |
| 24    | .022                                            | .114                    | 29.943  | .171    | 66.1                          | 76.2                           | 53.8 | 22.4  |
| 25    | <i>Sunday.</i>                                  |                         |         |         |                               |                                |      |       |
| 26    | .058                                            | .130                    | .995    | .135    | 67.5                          | 78.0                           | 56.0 | 22.0  |
| 27    | .126                                            | .195                    | 30.075  | .120    | 66.9                          | 78.8                           | 53.8 | 25.0  |
| 28    | .102                                            | .188                    | .025    | .163    | 67.6                          | 78.3                           | 55.5 | 22.8  |
| 29    | .062                                            | .150                    | .000    | .150    | 67.4                          | 77.2                           | 56.3 | 20.9  |
| 30    | .039                                            | .116                    | 29.997  | .119    | 66.1                          | 76.2                           | 55.3 | 20.9  |
| 31    | .048                                            | .135                    | .996    | .139    | 65.3                          | 77.4                           | 52.4 | 25.0  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of December, 1853—(Continued.)*

| Date. | Mean Wet Bulb Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew Point. | Mean Elastic force of Vapour. | Mean Weight of Vapour in a cubic foot of air. | Additional weight of Vapour required for complete saturation. | Mean degree of Humidity, complete saturation being unity. |
|-------|----------------------------|---------------------|---------------------|---------------------------|-------------------------------|-----------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|
|       | °                          | °                   | °                   | °                         | Inches.                       | T. gr.                                        | T. gr.                                                        |                                                           |
| 1     | 61.6                       | 7.7                 | 56.4                | 12.9                      | 0.464                         | 5.10                                          | 2.73                                                          | 0.651                                                     |
| 2     | 61.9                       | 7.0                 | 57.3                | 11.6                      | 0.477                         | 5.26                                          | 2.48                                                          | .680                                                      |
| 3     | 62.9                       | 6.3                 | 58.9                | 10.3                      | 0.504                         | 5.56                                          | 2.25                                                          | .712                                                      |
| 4     | Sunday.                    |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 5     | 61.7                       | 6.0                 | 57.8                | 9.9                       | 0.486                         | 5.37                                          | 2.09                                                          | .720                                                      |
| 6     | 60.8                       | 6.5                 | 56.4                | 10.9                      | 0.463                         | 5.12                                          | 2.25                                                          | .695                                                      |
| 7     | 59.9                       | 7.1                 | 54.8                | 12.2                      | 0.440                         | 4.86                                          | 2.44                                                          | .666                                                      |
| 8     | 59.2                       | 7.2                 | 54.0                | 12.4                      | 0.427                         | 4.74                                          | 2.43                                                          | .661                                                      |
| 9     | 57.9                       | 6.5                 | 53.0                | 11.4                      | 0.414                         | 4.61                                          | 2.13                                                          | .684                                                      |
| 10    | 60.2                       | 5.7                 | 56.3                | 9.6                       | 0.462                         | 5.13                                          | 1.93                                                          | .727                                                      |
| 11    | Sunday.                    |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 12    | 63.1                       | 5.2                 | 59.9                | 8.4                       | 0.521                         | 5.76                                          | 1.84                                                          | .758                                                      |
| 13    | 63.3                       | 4.8                 | 60.4                | 7.7                       | 0.529                         | 5.85                                          | 1.70                                                          | .775                                                      |
| 14    | 63.1                       | 5.5                 | 59.7                | 8.9                       | 0.517                         | 5.72                                          | 1.95                                                          | .746                                                      |
| 15    | 62.7                       | 5.6                 | 59.1                | 9.2                       | 0.508                         | 5.61                                          | 1.99                                                          | .738                                                      |
| 16    | 62.5                       | 5.9                 | 58.7                | 9.7                       | 0.501                         | 5.53                                          | 2.09                                                          | .726                                                      |
| 17    | 60.9                       | 7.1                 | 56.0                | 12.0                      | 0.458                         | 5.06                                          | 2.47                                                          | .672                                                      |
| 18    | Sunday.                    |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 19    | 58.1                       | 7.3                 | 52.6                | 12.8                      | 0.408                         | 4.53                                          | 2.42                                                          | .652                                                      |
| 20    | 57.4                       | 7.1                 | 52.0                | 12.5                      | 0.399                         | 4.44                                          | 2.32                                                          | .657                                                      |
| 21    | 56.9                       | 7.3                 | 51.2                | 13.0                      | 0.389                         | 4.33                                          | 2.36                                                          | .647                                                      |
| 22    | 58.2                       | 6.8                 | 53.1                | 11.9                      | 0.415                         | 4.62                                          | 2.25                                                          | .672                                                      |
| 23    | 60.3                       | 6.0                 | 56.2                | 10.1                      | 0.460                         | 5.11                                          | 2.04                                                          | .715                                                      |
| 24    | 60.3                       | 5.8                 | 56.3                | 9.8                       | 0.462                         | 5.13                                          | 1.97                                                          | .723                                                      |
| 25    | Sunday.                    |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 26    | 61.2                       | 6.3                 | 56.9                | 10.6                      | 0.472                         | 5.20                                          | 2.22                                                          | .701                                                      |
| 27    | 60.8                       | 6.1                 | 56.6                | 10.3                      | 0.467                         | 5.17                                          | 2.11                                                          | .710                                                      |
| 28    | 61.6                       | 6.0                 | 57.7                | 9.9                       | 0.484                         | 5.35                                          | 2.09                                                          | .719                                                      |
| 29    | 60.8                       | 6.6                 | 56.3                | 11.1                      | 0.462                         | 5.11                                          | 2.28                                                          | .691                                                      |
| 30    | 59.3                       | 6.8                 | 54.4                | 11.7                      | 0.434                         | 4.80                                          | 2.30                                                          | .676                                                      |
| 31    | 58.3                       | 7.0                 | 53.0                | 12.3                      | 0.414                         | 4.60                                          | 2.33                                                          | .664                                                      |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of December, 1853—(Continued.)*

| Date. | Max. Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                                     |
|-------|-----------------------|-------|-----------------------------------|----------------------------------------------------------------|
|       | o                     | Inc.  |                                   |                                                                |
| 1     | 94.0                  | ..    | W. or N. W. or N.                 | Cloudless.                                                     |
| 2     | 94.5                  | ..    | N. or N. W.                       | Ditto.                                                         |
| 3     | 94.0                  | ..    | N. N. W. or N. W.                 | Ditto.                                                         |
| 4     | Sunday.               |       |                                   |                                                                |
| 5     | 93.5                  | ..    | N. W.                             | Cloudless.                                                     |
| 6     | 92.0                  | ..    | N. W. or Calm.                    | Ditto.                                                         |
| 7     | 98.5                  | ..    | N. W.                             | Ditto.                                                         |
| 8     | 86.0                  | ..    | Calm or N. W.                     | Ditto.                                                         |
| 9     | 91.0                  | ..    | N. W.                             | Ditto.                                                         |
| 10    | 96.2                  | ..    | Ditto.                            | Cloudy till 6 A. M. cloudless afterwards.                      |
| 11    | Sunday.               |       |                                   |                                                                |
| 12    | 95.9                  | ..    | Calm or N. W.                     | Cloudless.                                                     |
| 13    | 93.6                  | ..    | N. N. W. or N. W.                 | Ditto.                                                         |
| 14    | 98.0                  | ..    | N. W.                             | Ditto.                                                         |
| 15    | 89.8                  | ..    | Ditto.                            | Ditto.                                                         |
| 16    | 97.0                  | ..    | Calm or N. W.                     | Cloudless till 4 A. M. scattered $\searrow$ till               |
| 17    | 90.0                  | ..    | N. or N. W.                       | 10 A. M. cloudless afterwards.                                 |
| 18    | Sunday                |       |                                   | Cloudless.                                                     |
| 19    | 89.6                  | ..    | N. W.                             | Cloudless.                                                     |
| 20    | 88.0                  | ..    | Calm or W. or N.                  | Ditto.                                                         |
| 21    | 92.0                  | ..    | N. W. or N.                       | Ditto.                                                         |
| 22    | 98.6                  | ..    | N. or N. W.                       | Ditto.                                                         |
| 23    | ....                  | ..    | Ditto.                            | Ditto.                                                         |
| 24    | ....                  | ..    | N. W.                             | Ditto.                                                         |
| 25    | Sunday.               |       |                                   |                                                                |
| 26    | ....                  | ..    | Calm or N. W. or N.               | Cloudless till 6 A. M. scattered $\searrow$ or $\swarrow$ till |
| 27    | ....                  | ..    | W. or N. W.                       | 6 P. M. cloudless afterwards.                                  |
| 28    | ....                  | ..    | N. W. or W. or calm.              | Cloudless till 6 A. M. scattered $\searrow$ till               |
| 29    | ....                  | ..    | N. W. or W.                       | 5 P. M. cloudless afterwards.                                  |
| 30    | ....                  | ..    | Calm or N. W.                     | Cloudless.                                                     |
| 31    | ....                  | ..    | Ditto.                            | Ditto.                                                         |

Symbols, ..... {  
 $\searrow$  i Cirri.  
 $\swarrow$  i Cirro-strati.  
 $\wedge$  i Cumuli.  
 $\wedge$  i Cumulo-strati.  
 $\swarrow$  i Nimbi.  
 $\searrow$  i Strati.  
 $\swarrow$  i Cirro-cumuli.



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of January, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Falt. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|-----------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                          | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                             | o    | o     |
| 1     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 2     | 30.019                                          | 30.106                                    | 29.977  | 0.129   | 65.0                          | 77.2                                          | 55.6 | 21.6  |
| 3     | 29.998                                          | .074                                      | .945    | .129    | 66.6                          | 77.7                                          | 58.5 | 19.2  |
| 4     | .988                                            | .052                                      | .934    | .118    | 67.7                          | 78.0                                          | 60.3 | 17.7  |
| 5     | 30.049                                          | .141                                      | 30.004  | .137    | 67.6                          | 77.8                                          | 59.6 | 18.2  |
| 6     | .058                                            | .143                                      | 29.988  | .155    | 68.5                          | 79.9                                          | 60.2 | 19.7  |
| 7     | .034                                            | .118                                      | .967    | .151    | 68.7                          | 80.0                                          | 60.0 | 20.0  |
| 8     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 9     | .051                                            | .126                                      | .994    | .132    | 67.8                          | 78.2                                          | 59.2 | 19.0  |
| 10    | .100                                            | .177                                      | 30.047  | .130    | 65.8                          | 76.4                                          | 57.0 | 19.4  |
| 11    | .078                                            | .178                                      | .017    | .161    | 64.7                          | 76.6                                          | 54.2 | 22.4  |
| 12    | .031                                            | .108                                      | 29.957  | .151    | 64.0                          | 75.8                                          | 55.0 | 20.8  |
| 13    | .052                                            | .103                                      | .998    | .105    | 65.6                          | 77.4                                          | 55.4 | 22.0  |
| 14    | .080                                            | .170                                      | 30.035  | .135    | 66.9                          | 78.7                                          | 57.4 | 21.3  |
| 15    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 16    | .038                                            | .119                                      | 29.935  | .134    | 66.6                          | 78.4                                          | 56.5 | 21.9  |
| 17    | .025                                            | .112                                      | .965    | .147    | 65.8                          | 77.7                                          | 56.3 | 21.4  |
| 18    | .000                                            | .078                                      | .934    | .144    | 64.8                          | 77.8                                          | 54.6 | 23.2  |
| 19    | 29.992                                          | .078                                      | .924    | .154    | 64.4                          | 77.7                                          | 54.4 | 23.3  |
| 20    | .999                                            | .085                                      | .929    | .156    | 65.2                          | 78.4                                          | 54.2 | 24.2  |
| 21    | .993                                            | .072                                      | .920    | .152    | 65.7                          | 78.8                                          | 55.3 | 23.5  |
| 22    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 23    | 30.025                                          | .121                                      | .965    | .156    | 66.4                          | 78.7                                          | 56.1 | 22.6  |
| 24    | .023                                            | .120                                      | .958    | .162    | 66.8                          | 79.0                                          | 56.4 | 22.6  |
| 25    | .005                                            | .095                                      | .938    | .157    | 67.5                          | 79.8                                          | 57.0 | 22.8  |
| 26    | 29.995                                          | .072                                      | .929    | .143    | 69.1                          | 80.6                                          | 60.0 | 20.6  |
| 27    | 30.031                                          | .111                                      | .970    | .141    | 71.1                          | 82.4                                          | 63.0 | 19.4  |
| 28    | .011                                            | .101                                      | .943    | .158    | 71.3                          | 82.8                                          | 61.8 | 21.0  |
| 29    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                               |      |       |
| 30    | 29.936                                          | .016                                      | .879    | .137    | 71.7                          | 82.5                                          | 63.4 | 19.1  |
| 31    | .945                                            | .019                                      | .884    | .135    | 72.0                          | 83.6                                          | 64.4 | 19.2  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of January, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                    |
| 1     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                    |
| 2     | 61.5                            | 3.5                 | 59.4                | 5.7                          | 0.517                            | 5.74                                             | 1.28                                                                    | 0.835                                                              |
| 3     | 62.6                            | 4.0                 | 60.3                | 6.3                          | .532                             | 5.89                                             | 1.46                                                                    | .816                                                               |
| 4     | 63.8                            | 3.9                 | 61.7                | 6.0                          | .554                             | 6.12                                             | 1.44                                                                    | .826                                                               |
| 5     | 63.0                            | 4.6                 | 60.5                | 7.1                          | .532                             | 5.88                                             | 1.66                                                                    | .798                                                               |
| 6     | 64.2                            | 4.3                 | 61.8                | 6.8                          | .558                             | 6.15                                             | 1.62                                                                    | .807                                                               |
| 7     | 64.7                            | 4.0                 | 62.4                | 6.2                          | .570                             | 6.28                                             | 1.53                                                                    | .822                                                               |
| 8     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                    |
| 9     | 63.2                            | 4.6                 | 60.6                | 7.1                          | .536                             | 5.92                                             | 1.69                                                                    | .803                                                               |
| 10    | 61.4                            | 4.4                 | 58.9                | 6.9                          | .506                             | 5.61                                             | 1.55                                                                    | .808                                                               |
| 11    | 59.7                            | 5.0                 | 56.8                | 8.0                          | .471                             | 5.23                                             | 1.73                                                                    | .780                                                               |
| 12    | 59.4                            | 4.7                 | 56.6                | 7.5                          | .468                             | 5.21                                             | 1.59                                                                    | .790                                                               |
| 13    | 61.5                            | 4.0                 | 59.2                | 6.4                          | .513                             | 5.69                                             | 1.46                                                                    | .818                                                               |
| 14    | 62.3                            | 4.6                 | 59.8                | 7.1                          | .521                             | 5.76                                             | 1.67                                                                    | .801                                                               |
| 15    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                    |
| 16    | 61.2                            | 5.4                 | 58.1                | 8.4                          | .494                             | 5.47                                             | 1.90                                                                    | .768                                                               |
| 17    | 60.7                            | 5.1                 | 57.7                | 8.1                          | .486                             | 5.39                                             | 1.79                                                                    | .778                                                               |
| 18    | 60.3                            | 4.5                 | 57.6                | 7.2                          | .487                             | 5.40                                             | 1.60                                                                    | .796                                                               |
| 19    | 59.2                            | 5.2                 | 56.1                | 8.3                          | .460                             | 5.12                                             | 1.78                                                                    | .774                                                               |
| 20    | 59.5                            | 5.7                 | 56.2                | 9.0                          | .463                             | 5.13                                             | 1.98                                                                    | .754                                                               |
| 21    | 60.1                            | 5.6                 | 56.9                | 8.8                          | .474                             | 5.25                                             | 1.96                                                                    | .762                                                               |
| 22    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                    |
| 23    | 61.7                            | 4.7                 | 59.0                | 7.4                          | .508                             | 5.63                                             | 1.71                                                                    | .797                                                               |
| 24    | 62.4                            | 4.4                 | 59.9                | 6.9                          | .525                             | 5.80                                             | 1.64                                                                    | .806                                                               |
| 25    | 63.0                            | 4.4                 | 60.6                | 6.9                          | .537                             | 5.92                                             | 1.68                                                                    | .805                                                               |
| 26    | 64.9                            | 4.2                 | 62.6                | 6.5                          | .573                             | 6.30                                             | 1.65                                                                    | .816                                                               |
| 27    | 67.0                            | 4.1                 | 64.8                | 6.3                          | .615                             | 6.74                                             | 1.69                                                                    | .823                                                               |
| 28    | 66.4                            | 4.9                 | 63.8                | 7.4                          | .596                             | 6.53                                             | 1.96                                                                    | .796                                                               |
| 29    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                    |
| 30    | 68.5                            | 3.3                 | 66.8                | 5.0                          | .657                             | 7.20                                             | 1.38                                                                    | .858                                                               |
| 31    | 68.9                            | 3.2                 | 67.2                | 4.8                          | .666                             | 7.30                                             | 1.38                                                                    | .866                                                               |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of January, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Hour.          | Mean Height of the Ba-<br>rometer at 32° Fahrt. | Range of the Barometer for<br>each hour during<br>the month. |         |         | Mean Dry Bulb Thermo-<br>meter. | Range of the<br>Temperature for each<br>hour during the<br>month. |      |       |
|----------------|-------------------------------------------------|--------------------------------------------------------------|---------|---------|---------------------------------|-------------------------------------------------------------------|------|-------|
|                |                                                 | Max.                                                         | Min.    | Diff.   |                                 | Max.                                                              | Min. | Diff. |
|                | Inches.                                         | Inches.                                                      | Inches. | Inches. | o                               | o                                                                 | o    | o     |
| Mid-<br>night. | 30.020                                          | 30.092                                                       | 29.926  | 0.166   | 62.5                            | 68.2                                                              | 58.7 | 9.5   |
| 1              | .016                                            | .092                                                         | .928    | .164    | 61.5                            | 67.3                                                              | 57.6 | 9.7   |
| 2              | .007                                            | .078                                                         | .917    | .161    | 60.8                            | 66.8                                                              | 56.9 | 9.9   |
| 3              | .000                                            | .075                                                         | .912    | .163    | 60.3                            | 66.0                                                              | 56.9 | 9.1   |
| 4              | 29.997                                          | .076                                                         | .913    | .163    | 59.7                            | 65.5                                                              | 56.1 | 9.4   |
| 5              | 30.004                                          | .084                                                         | .921    | .163    | 59.1                            | 65.2                                                              | 55.1 | 10.1  |
| 6              | .021                                            | .102                                                         | .939    | .163    | 58.5                            | 64.4                                                              | 54.8 | 9.6   |
| 7              | .047                                            | .125                                                         | .959    | .166    | 58.0                            | 65.0                                                              | 54.2 | 10.8  |
| 8              | .076                                            | .152                                                         | .985    | .167    | 60.4                            | 64.8                                                              | 56.7 | 8.1   |
| 9              | .099                                            | .177                                                         | 30.005  | .172    | 65.0                            | 69.1                                                              | 60.9 | 8.2   |
| 10             | .102                                            | .178                                                         | .016    | .162    | 69.3                            | 73.4                                                              | 64.8 | 8.6   |
| 11             | .084                                            | .171                                                         | 29.991  | .180    | 72.4                            | 76.6                                                              | 67.8 | 8.8   |
| Noon.          | .050                                            | .126                                                         | .970    | .156    | 75.4                            | 80.4                                                              | 71.7 | 8.7   |
| 1              | .014                                            | .092                                                         | .934    | .158    | 77.6                            | 82.0                                                              | 74.4 | 7.6   |
| 2              | 29.987                                          | .070                                                         | .907    | .163    | 78.4                            | 83.4                                                              | 75.2 | 8.2   |
| 3              | .971                                            | .051                                                         | .887    | .164    | 78.8                            | 83.6                                                              | 75.8 | 7.8   |
| 4              | .963                                            | .047                                                         | .879    | .168    | 76.7                            | 81.8                                                              | 73.8 | 8.0   |
| 5              | .970                                            | .052                                                         | .881    | .171    | 75.0                            | 80.1                                                              | 72.2 | 7.9   |
| 6              | .980                                            | .058                                                         | .892    | .166    | 71.8                            | 76.8                                                              | 69.0 | 7.8   |
| 7              | .998                                            | .077                                                         | .913    | .164    | 69.4                            | 74.0                                                              | 66.2 | 7.8   |
| 8              | 30.016                                          | .098                                                         | .925    | .173    | 67.5                            | 72.0                                                              | 64.2 | 7.8   |
| 9              | .028                                            | .109                                                         | .944    | .165    | 66.0                            | 70.8                                                              | 62.3 | 8.5   |
| 10             | .034                                            | .113                                                         | .953    | .160    | 64.7                            | 69.7                                                              | 61.3 | 8.4   |
| 11             | .031                                            | .105                                                         | .930    | .175    | 63.7                            | 69.9                                                              | 60.1 | 9.8   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta in the  
month of January, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| Mid-<br>night. | 60.6                            | 1.9                 | 59.3                | 3.2                          | 0.513                            | 5.73                                             | 0.65                                                                    | 0.898                                                               |
| 1              | 59.6                            | 1.8                 | 58.2                | 3.3                          | .495                             | .54                                              | .63                                                                     | .898                                                                |
| 2              | 59.1                            | 1.7                 | 57.7                | 3.1                          | .488                             | .46                                              | .58                                                                     | .903                                                                |
| 3              | 58.5                            | 1.8                 | 57.1                | 3.2                          | .477                             | .35                                              | .60                                                                     | .899                                                                |
| 4              | 58.0                            | 1.7                 | 56.6                | 3.1                          | .470                             | .27                                              | .56                                                                     | .903                                                                |
| 5              | 57.5                            | 1.6                 | 56.1                | 2.9                          | .463                             | .24                                              | .52                                                                     | .908                                                                |
| 6              | 57.0                            | 1.5                 | 55.6                | 2.8                          | .455                             | .12                                              | .50                                                                     | .910                                                                |
| 7              | 56.7                            | 1.3                 | 55.5                | 2.5                          | .453                             | .10                                              | .43                                                                     | .920                                                                |
| 8              | 58.4                            | 2.0                 | 56.9                | 3.5                          | .474                             | .32                                              | .64                                                                     | .890                                                                |
| 9              | 61.6                            | 3.4                 | 59.4                | 5.6                          | .516                             | .73                                              | 1.15                                                                    | .832                                                                |
| 10             | 64.0                            | 5.4                 | 61.1                | 8.2                          | .547                             | 6.02                                             | 1.83                                                                    | .764                                                                |
| 11             | 65.5                            | 6.8                 | 62.1                | 10.3                         | .567                             | .17                                              | 2.44                                                                    | .715                                                                |
| Noon.          | 66.9                            | 8.5                 | 62.6                | 12.9                         | .574                             | .25                                              | 3.20                                                                    | .660                                                                |
| 1              | 67.9                            | 9.6                 | 63.1                | 14.5                         | .584                             | .32                                              | 3.76                                                                    | .626                                                                |
| 2              | 68.0                            | 10.4                | 62.8                | 15.6                         | .577                             | .24                                              | 4.10                                                                    | .603                                                                |
| 3              | 68.3                            | 10.5                | 63.1                | 15.8                         | .583                             | .29                                              | 4.17                                                                    | .601                                                                |
| 4              | 67.2                            | 9.6                 | 62.4                | 14.4                         | .569                             | .18                                              | 3.66                                                                    | .627                                                                |
| 5              | 67.3                            | 7.7                 | 63.4                | 11.6                         | .589                             | .41                                              | 2.92                                                                    | .688                                                                |
| 6              | 66.8                            | 5.0                 | 64.2                | 7.6                          | .604                             | .62                                              | 1.85                                                                    | .781                                                                |
| 7              | 65.4                            | 4.0                 | 63.2                | 6.2                          | .555                             | .44                                              | 1.44                                                                    | .817                                                                |
| 8              | 64.3                            | 3.3                 | 62.3                | 5.2                          | .568                             | .28                                              | 1.17                                                                    | .843                                                                |
| 9              | 63.1                            | 2.9                 | 61.3                | 4.7                          | .549                             | .08                                              | 1.01                                                                    | .857                                                                |
| 10             | 62.2                            | 2.6                 | 60.5                | 4.2                          | .535                             | 5.94                                             | 0.89                                                                    | .870                                                                |
| 11             | 61.5                            | 2.3                 | 59.9                | 3.8                          | .524                             | .84                                              | .78                                                                     | .882                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of January, 1854.*

Solar radiation. Weather, &c.

| Date. | Max. Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                                                                       |
|-------|-----------------------|-------|-----------------------------------|--------------------------------------------------------------------------------------------------|
|       | o                     | Inc.  |                                   |                                                                                                  |
| 1     | <i>Sunday.</i>        |       |                                   |                                                                                                  |
| 2     | 130.1                 | ..    | N. W. or W.                       | Cloudless.                                                                                       |
| 3     | 128.0                 | ..    | N. W.                             | Cloudless till 3 A. M. scattered \i and \i till 7 P. M. cloudless afterwards.                    |
| 4     | 126.2                 | ..    | Calm or N. W.                     | Ditto 4 A. M. ditto ditto 5 P. M. ditto.                                                         |
| 5     | 129.8                 | ..    | N. N. W. or N. W.                 | Nearly cloudless the whole day.                                                                  |
| 6     | 130.5                 | ..    | N. N. W. or N. W.                 | Cloudless.                                                                                       |
| 7     | 131.0                 | ..    | N. W. or W.                       | Cloudless till 6 A. M. scattered \i till 6 P. M. cloudless afterwards.                           |
| 8     | <i>Sunday.</i>        |       |                                   |                                                                                                  |
| 9     | 133.4                 | ..    | N. or N. N. W.                    | Cloudless nearly the whole day. [wards.                                                          |
| 10    | 130.0                 | ..    | N. W. or W.                       | Cloudless till 11 P. M. scattered \i after-                                                      |
| 11    | 130.4                 | ..    | W. or N. W.                       | Cloudless till 8 A. M. scattered \i till 5 P. M. scattered \i till 8 P. M. cloudless afterwards. |
| 12    | 127.0                 | ..    | Ditto.                            | Cloudless till 6 A. M. scattered \i or \i or \i till 4 P. M. cloudless afterwards.               |
| 13    | 128.0                 | ..    | W. or N.                          | Cloudless till 3 A. M. scattered \i or \i afterwards.                                            |
| 14    | 131.2                 | ..    | N. or N. W.                       | Nearly cloudless the whole day.                                                                  |
| 15    | <i>Sunday.</i>        |       |                                   | [afterwards.                                                                                     |
| 16    | 127.0                 | ..    | W. or N. W.                       | Scattered \i till 8 A. M. nearly cloudless                                                       |
| 17    | 133.0                 | ..    | N. W.                             | Cloudless.                                                                                       |
| 18    | 127.0                 | ..    | Ditto.                            | Ditto.                                                                                           |
| 19    | 130.7                 | ..    | N. W. or W.                       | Ditto.                                                                                           |
| 20    | 132.0                 | ..    | Ditto.                            | Ditto.                                                                                           |
| 21    | 134.0                 | ..    | Ditto.                            | Cloudless till 10 A. M. scattered \i or \i till 6 P. M. cloudless afterwards.                    |
| 22    | <i>Sunday.</i>        |       |                                   |                                                                                                  |
| 23    | 135.0                 | ..    | W. or N. W. or calm.              | Cloudless.                                                                                       |
| 24    | 132.0                 | ..    | Calm or N. W. or S. W.            | Cloudless till 6 A. M. scattered \i or \i till 8 P. M. cloudless afterwards.                     |
| 25    | 127.0                 | ..    | W. or S. W.                       | Ditto 5 A. M. ditto ditto 6 P. M. ditto.                                                         |
| 26    | 131.0                 | ..    | S. W.                             | Cloudless nearly the whole day.                                                                  |
| 27    | 132.0                 | ..    | S. W. or N.                       | Cloudless.                                                                                       |
| 28    | 134.0                 | ..    | S. W. or S. E.                    | Ditto.                                                                                           |
| 29    | <i>Sunday.</i>        |       |                                   |                                                                                                  |
| 30    | 135.0                 | ..    | S. E. or S.                       | Cloudless—fogs in the morning.                                                                   |
| 31    | 135.0                 | ..    | Ditto.                            | Cloudless with fogs in the morning.                                                              |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of November, 1853.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.547     | 82.3         | 84.4    | 66.5      | ..                   | ..       | N. W.                  | Clear                |
| 2     | 29.517     | 78.0         | 79.2    | 67.9      | ..                   | ..       | N. W.                  | Ditto                |
| 3     | 29.593     | 79.8         | 81.1    | 68.5      | ..                   | ..       | W.                     | Ditto                |
| 4     | 29.467     | 81.0         | 82.5    | 66.4      | ..                   | ..       | W.                     | Ditto                |
| 5     | 29.481     | 79.0         | 79.9    | 64.4      | ..                   | ..       | N. W.                  | Ditto                |
| 6     | 29.493     | 80.0         | 81.0    | 67.0      | ..                   | ..       | N. W.                  | Ditto                |
| 7     | 29.474     | 83.0         | 83.5    | 65.0      | ..                   | ..       | N. W.                  | Ditto                |
| 8     | 29.443     | 80.9         | 82.0    | 66.0      | ..                   | ..       | N. W.                  | Ditto                |
| 9     | 29.475     | 79.0         | 79.9    | 62.0      | ..                   | ..       | N. W.                  | Ditto                |
| 10    | 29.533     | 77.9         | 78.3    | 61.5      | ..                   | ..       | N. W.                  | Ditto                |
| 11    | 29.531     | 78.0         | 78.6    | 62.0      | ..                   | ..       | W.                     | Ditto                |
| 12    | 29.433     | 76.5         | 78.2    | 65.0      | ..                   | ..       | S. E.                  | Ditto                |
| 13    | 29.451     | 74.0         | 75.0    | 65.0      | ..                   | ..       | S. E.                  | Ditto                |
| 14    | 29.483     | 73.8         | 75.5    | 67.6      | ..                   | ..       | S. E.                  | Ditto                |
| 15    | 29.489     | 71.0         | 71.5    | 61.8      | ..                   | ..       | E.                     | Ditto                |
| 16    | 29.487     | 70.9         | 71.6    | 62.9      | ..                   | ..       | N. W.                  | Ditto                |
| 17    | 29.519     | 67.4         | 68.4    | 58.0      | ..                   | ..       | N. W.                  | Ditto                |
| 18    | 29.591     | 67.5         | 68.6    | 57.3      | ..                   | ..       | W.                     | Ditto                |
| 19    | 29.559     | 67.0         | 69.1    | 55.5      | ..                   | ..       | W.                     | Ditto                |
| 20    | 29.593     | 68.0         | 69.5    | 56.0      | ..                   | ..       | N. W.                  | Ditto                |
| 21    | 29.571     | 69.0         | 70.0    | 56.5      | ..                   | ..       | N. W.                  | \ scattered          |
| 22    | 29.588     | 70.1         | 71.0    | 57.0      | ..                   | ..       | W.                     | Clear                |
| 23    | 29.575     | 68.8         | 70.0    | 59.0      | ..                   | ..       | N. W.                  | \ scattered to W.    |
| 24    | 29.533     | 68.0         | 69.0    | 59.0      | ..                   | ..       | N. W.                  | Clear                |
| 25    | 29.589     | 68.0         | 70.3    | 59.4      | ..                   | ..       | N. W.                  | Ditto                |
| 26    | 29.547     | 69.8         | 71.9    | 58.0      | ..                   | ..       | N. W.                  | Ditto                |
| 27    | 29.445     | 70.5         | 71.0    | 63.5      | ..                   | ..       | N. W.                  | Ditto                |
| 28    | 29.513     | 70.0         | 72.6    | 59.9      | ..                   | ..       | S.                     | Ditto                |
| 29    | 29.533     | 67.0         | 68.5    | 58.0      | ..                   | ..       | N.                     | Ditto                |
| 30    | 29.601     | 64.5         | 65.5    | 54.8      | ..                   | ..       | W.                     | \ very few in zenith |
| Mean. | 29.522     | 73.4         | 74.6    | 61.7      | ..                   | ..       | ..                     | .....                |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of November, 1853.*

## Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.515     | 84.5         | 85.2    | 67.2      | ..                   | ..       | N. W.                  | Clear                |
| 2     | 29.493     | 79.0         | 80.4    | 68.1      | ..                   | ..       | N. W.                  | Ditto                |
| 3     | 29.513     | 78.5         | 79.0    | 66.0      | ..                   | ..       | W.                     | Ditto                |
| 4     | 29.451     | 83.7         | 85.0    | 67.0      | ..                   | ..       | N. W.                  | Ditto                |
| 5     | 29.455     | 82.8         | 83.9    | 65.4      | ..                   | ..       | N. W.                  | Ditto                |
| 6     | 29.483     | 82.0         | 83.0    | 68.0      | ..                   | ..       | N. W.                  | Ditto                |
| 7     | 29.459     | 85.1         | 85.9    | 65.6      | ..                   | ..       | N. W.                  | Ditto                |
| 8     | 29.427     | 84.6         | 85.5    | 67.3      | ..                   | ..       | N. W.                  | Ditto                |
| 9     | 29.457     | 82.0         | 82.6    | 63.0      | ..                   | ..       | N. W.                  | Ditto                |
| 10    | 29.493     | 82.9         | 83.5    | 62.9      | ..                   | ..       | N. W.                  | Ditto                |
| 11    | 29.491     | 80.0         | 81.8    | 63.0      | ..                   | ..       | W.                     | Ditto                |
| 12    | 29.394     | 78.9         | 79.2    | 66.5      | ..                   | ..       | S. E.                  | Ditto                |
| 13    | 29.419     | 76.2         | 77.0    | 66.0      | ..                   | ..       | S. E.                  | Ditto                |
| 14    | 29.425     | 75.0         | 76.5    | 68.0      | ..                   | ..       | S. E.                  | Ditto                |
| 15    | 29.431     | 74.2         | 75.7    | 62.9      | ..                   | ..       | N. W.                  | Ditto                |
| 16    | 29.455     | 75.0         | 76.0    | 59.5      | ..                   | ..       | N. W.                  | Ditto                |
| 17    | 29.505     | 71.6         | 72.6    | 58.9      | ..                   | ..       | W.                     | Ditto                |
| 18    | 29.551     | 69.8         | 69.9    | 58.2      | ..                   | ..       | W.                     | Ditto                |
| 19    | 29.515     | 69.0         | 70.0    | 56.0      | ..                   | ..       | N. W.                  | Ditto                |
| 20    | 29.557     | 70.0         | 71.7    | 56.9      | ..                   | ..       | N. W.                  | Ditto                |
| 21    | 29.539     | 74.5         | 75.0    | 57.0      | ..                   | ..       | N. W.                  | \ scattered          |
| 22    | 29.563     | 72.8         | 73.4    | 58.6      | ..                   | ..       | W.                     | \ to E. & N.         |
| 23    | 29.529     | 73.0         | 74.2    | 60.0      | ..                   | ..       | W.                     | Clear                |
| 24    | 29.523     | 73.0         | 74.0    | 59.9      | ..                   | ..       | N. W.                  | Ditto                |
| 25    | 29.555     | 71.0         | 72.2    | 60.1      | ..                   | ..       | N. W.                  | Ditto                |
| 26    | 29.505     | 72.6         | 73.5    | 59.2      | ..                   | ..       | N. W.                  | Ditto                |
| 27    | 29.405     | 74.0         | 75.0    | 64.6      | ..                   | ..       | N. W.                  | Ditto                |
| 28    | 29.487     | 74.0         | 75.1    | 60.0      | ..                   | ..       | S.                     | \ a few to S. E.     |
| 29    | 29.497     | 73.0         | 74.1    | 59.4      | ..                   | ..       | N.                     | Clear                |
| 30    | 29.581     | 72.0         | 73.9    | 58.4      | ..                   | ..       | W.                     | \ very few in zenith |
| Mean. | 29.489     | 76.5         | 77.5    | 62.5      | ..                   | ..       | ..                     | .....                |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of November, 1853.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Rain Gauges.                 |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.455     | 93.8         | 93.8    | 69.5      | 92.9                 | 72.2     | 82.55 | ~ scattered        | ..                           | N.W.                   |
| 2     | 29.411     | 86.0         | 86.9    | 69.5      | 87.6                 | 68.7     | 77.7  | Clear              | ..                           | N.W.                   |
| 3     | 29.425     | 88.0         | 88.6    | 67.7      | 89.0                 | 71.0     | 75.0  | Ditto              | ..                           | W.                     |
| 4     | 29.405     | 89.6         | 89.5    | 81.0      | 88.6                 | 70.2     | 79.4  | Ditto              | ..                           | N.W.                   |
| 5     | 29.395     | 89.2         | 89.4    | 66.3      | 88.4                 | 68.3     | 78.35 | Ditto              | ..                           | N.W.                   |
| 6     | 29.421     | 89.2         | 89.6    | 68.5      | 88.5                 | 69.0     | 78.75 | Ditto              | ..                           | N.W.                   |
| 7     | 29.393     | 90.1         | 89.9    | 69.0      | 88.9                 | 63.3     | 76.1  | Ditto              | ..                           | N.W.                   |
| 8     | 29.369     | 88.9         | 89.2    | 67.4      | 88.4                 | 71.0     | 79.7  | Ditto              | ..                           | N.W.                   |
| 9     | 29.403     | 86.8         | 86.5    | 65.0      | 85.5                 | 67.2     | 76.35 | Ditto              | ..                           | N.W.                   |
| 10    | 29.445     | 88.0         | 88.3    | 65.0      | 87.3                 | 64.      | 75.65 | Ditto              | ..                           | N.W.                   |
| 11    | 29.443     | 86.0         | 86.4    | 65.0      | 85.4                 | 63.0     | 74.2  | Ditto              | ..                           | W.                     |
| 12    | 29.309     | 85.0         | 85.6    | 70.2      | 85.5                 | 65.8     | 75.65 | Ditto              | ..                           | S. E.                  |
| 13    | 29.351     | 84.0         | 85.0    | 67.5      | 85.0                 | 63.0     | 74.0  | Ditto              | ..                           | S. E.                  |
| 14    | 29.385     | 83.5         | 84.9    | 67.3      | 84.0                 | 61.8     | 72.9  | Ditto.             | ..                           | E.                     |
| 15    | 29.439     | 83.8         | 83.8    | 69.0      | 83.0                 | 62.0     | 72.5  | ~ scattered        | ..                           | E.                     |
| 16    | 29.393     | 79.9         | 80.5    | 66.0      | 78.6                 | 62.0     | 70.8  | Clear              | ..                           | N.W.                   |
| 17    | 29.459     | 77.7         | 77.0    | 62.0      | 76.5                 | 58.0     | 66.75 | Ditto              | ..                           | W.                     |
| 18    | 29.493     | 77.9         | 77.8    | 60.5      | 77.0                 | 55.9     | 66.45 | Ditto              | ..                           | W.                     |
| 19    | 29.481     | 77.5         | 78.0    | 59.6      | 77.0                 | 54.0     | 65.5  | Ditto              | ..                           | N.W.                   |
| 20    | 29.503     | 78.5         | 79.0    | 58.0      | 78.2                 | 54.0     | 66.1  | Ditto              | ..                           | N.W.                   |
| 21    | 29.489     | 80.0         | 79.0    | 60.9      | 78.8                 | 53.0     | 65.9  | ~ scattered        | ..                           | W.                     |
| 22    | 29.513     | 78.2         | 80.0    | 60.9      | 79.0                 | 56.0     | 67.5  | Clear              | ..                           | W.                     |
| 23    | 29.497     | 77.8         | 77.3    | 61.5      | 77.5                 | 53.      | 67.75 | ~ all over         | ..                           | N.W.                   |
| 24    | 29.475     | 77.9         | 78.2    | 63.0      | 78.0                 | 58.0     | 68.0  | Clear              | ..                           | N.W.                   |
| 25    | 29.485     | 79.5         | 79.8    | 61.0      | 78.6                 | 57.2     | 67.9  | Ditto              | ..                           | N.W.                   |
| 26    | 29.445     | 81.6         | 81.0    | 62.4      | 80.0                 | 56.      | 68.0  | Ditto              | ..                           | N.W.                   |
| 27    | 29.333     | 78.0         | 79.2    | 65.0      | 79.8                 | 53.0     | 68.9  | Ditto              | ..                           | N.W.                   |
| 28    | 29.425     | 78.6         | 78.2    | 62.9      | 80.0                 | 53.0     | 69.0  | ~ scattered        | ..                           | S.                     |
| 29    | 29.471     | 79.8         | 79.5    | 60.9      | 79.0                 | 58.5     | 68.25 | Clear              | ..                           | N.                     |
| 30    | 29.541     | 78.0         | 77.25   | 59.0      | 76.3                 | 56.5     | 66.4  | ~ scattered        | ..                           | N.W.                   |
| Mn.   | 29.435     | 83.1         | 83.4    | 65.05     | 82.7                 | 61.72    | 72.1  | ....               | ..                           | ..                     |



*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of December, 1853.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                    |
| 1     | 29.571     | 66.0         | 67.4    | 56.5      | ..                   | ..       | W.                     | ✓ scattered        |
| 2     | 29.575     | 69.0         | 70.5    | 57.0      | ..                   | ..       | S.                     | Clear              |
| 3     | 29.655     | 67.0         | 68.6    | 56.4      | ..                   | ..       | S. E.                  | Ditto              |
| 4     | 29.605     | 68.0         | 69.0    | 56.8      | ..                   | ..       | E.                     | Ditto              |
| 5     | 29.575     | 69.5         | 70.0    | 57.2      | ..                   | ..       | N. W.                  | Ditto              |
| 6     | 29.591     | 65.5         | 67.0    | 57.3      | ..                   | ..       | N. W.                  | Ditto              |
| 7     | 29.569     | 63.5         | 64.6    | 52.0      | ..                   | ..       | N. W.                  | Ditto              |
| 8     | 29.587     | 62.0         | 63.3    | 52.0      | ..                   | ..       | N. W.                  | Ditto              |
| 9     | 29.543     | 63.0         | 64.2    | 53.0      | ..                   | ..       | N. W.                  | Ditto              |
| 10    | 29.599     | 63.0         | 65.0    | 54.9      | ..                   | ..       | N. W.                  | Ditto              |
| 11    | 29.673     | 63.0         | 64.6    | 55.0      | ..                   | ..       | N.                     | Ditto              |
| 12    | 29.627     | 62.8         | 64.0    | 54.5      | ..                   | ..       | N. W.                  | Ditto              |
| 13    | 29.669     | 63.0         | 65.0    | 55.2      | ..                   | ..       | N.                     | Ditto              |
| 14    | 29.589     | 64.5         | 66.0    | 57.0      | ..                   | ..       | W.                     | Ditto              |
| 15    | 29.625     | 66.6         | 68.6    | 56.8      | ..                   | ..       | W.                     | Ditto              |
| 16    | 29.623     | 65.2         | 67.5    | 58.2      | ..                   | ..       | W.                     | Ditto              |
| 17    | 29.675     | 65.0         | 66.4    | 56.8      | ..                   | ..       | N. E.                  | ✓ scattered        |
| 18    | 29.655     | 63.8         | 65.0    | 54.2      | ..                   | ..       | N.                     | Clear              |
| 19    | 29.615     | 64.0         | 66.0    | 52.0      | ..                   | ..       | W.                     | Ditto              |
| 20    | 29.665     | 64.5         | 65.6    | 52.0      | ..                   | ..       | N.                     | Ditto              |
| 21    | 29.605     | 64.5         | 65.5    | 51.9      | ..                   | ..       | W.                     | Ditto              |
| 22    | 29.655     | 61.7         | 63.0    | 53.3      | ..                   | ..       | W.                     | Few ✓ to N. and W. |
| 23    | 29.699     | 61.2         | 62.9    | 53.5      | ..                   | ..       | N. W.                  | ✓ Scattered        |
| 24    | 29.669     | 61.0         | 63.0    | 52.3      | ..                   | ..       | N.                     | Clear              |
| 25    | 29.649     | 62.5         | 64.0    | 53.0      | ..                   | ..       | N.                     | ✓ all over         |
| 26    | 29.651     | 65.0         | 66.0    | 53.6      | ..                   | ..       | N. W.                  | ✓ scattered        |
| 27    | 29.655     | 63.6         | 65.3    | 52.0      | ..                   | ..       | N. W.                  | Clear              |
| 28    | 29.741     | 62.1         | 63.9    | 52.0      | ..                   | ..       | W.                     | Ditto              |
| 29    | 29.681     | 62.5         | 63.9    | 52.0      | ..                   | ..       | W.                     | Ditto              |
| 30    | 29.641     | 61.5         | 63.2    | 50.6      | ..                   | ..       | N. W.                  | Ditto              |
| 31    | 29.643     | 58.0         | 61.2    | 49.4      | ..                   | ..       | N. W.                  | Ditto              |
| Mean. | 29.631     | 64.0         | 65.5    | 54.1      | .                    | ..       | ..                     | ..                 |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of December, 1853.*

| Observations at apparent Noon. |            |              |         |           |                      |          |                        |                    |
|--------------------------------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------|
| Date.                          | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky. |
|                                |            | Mercury.     | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                    |
| 1                              | 29.551     | 68.9         | 69.4    | 57.5      | ..                   | ..       | W.                     | ☼ to E. and N.     |
| 2                              | 29.567     | 71.0         | 72.0    | 57.5      | ..                   | ..       | S.                     | ☼ scattered        |
| 3                              | 29.603     | 72.0         | 73.0    | 59.0      | ..                   | ..       | S. E.                  | Clear              |
| 4                              | 29.573     | 73.0         | 74.2    | 59.5      | ..                   | ..       | E.                     | Ditto              |
| 5                              | 29.515     | 73.0         | 73.3    | 58.8      | ..                   | ..       | N. W.                  | Ditto              |
| 6                              | 29.569     | 69.7         | 70.3    | 57.3      | ..                   | ..       | N. W.                  | Ditto              |
| 7                              | 29.531     | 68.0         | 69.0    | 56.0      | ..                   | ..       | N. W.                  | Ditto              |
| 8                              | 29.531     | 66.8         | 67.2    | 53.0      | ..                   | ..       | N. W.                  | Ditto              |
| 9                              | 29.521     | 68.5         | 70.4    | 55.5      | ..                   | ..       | N. W.                  | Ditto              |
| 10                             | 29.559     | 69.2         | 71.5    | 56.0      | ..                   | ..       | N. W.                  | Ditto              |
| 11                             | 29.633     | 68.0         | 69.5    | 57.0      | ..                   | ..       | N.                     | Ditto              |
| 12                             | 29.593     | 66.9         | 66.9    | 55.0      | ..                   | ..       | N. W.                  | Ditto              |
| 13                             | 29.625     | 67.0         | 65.6    | 56.6      | ..                   | ..       | N.                     | Ditto              |
| 14                             | 29.411     | 66.0         | 66.2    | 55.0      | ..                   | ..       | W.                     | Ditto              |
| 15                             | 29.601     | 70.0         | 72.0    | 58.0      | ..                   | ..       | W.                     | Ditto              |
| 16                             | 29.593     | 70.0         | 71.0    | 60.0      | ..                   | ..       | W.                     | Ditto              |
| 17                             | 29.605     | 70.0         | 71.5    | 59.0      | ..                   | ..       | N.                     | ☼ scattered        |
| 18                             | 29.625     | 70.5         | 71.9    | 56.5      | ..                   | ..       | N.                     | Clear              |
| 19                             | 29.593     | 66.0         | 67.0    | 53.0      | ..                   | ..       | W.                     | ☼ to W.            |
| 20                             | 29.625     | 66.5         | 68.0    | 53.4      | ..                   | ..       | N.                     | Clear              |
| 21                             | 29.591     | 67.0         | 66.0    | 54.0      | ..                   | ..       | W.                     | Ditto              |
| 22                             | 29.627     | 64.2         | 65.9    | 55.0      | ..                   | ..       | W.                     | Few ☼ to N. and W. |
| 23                             | 29.645     | 65.0         | 65.9    | 55.0      | ..                   | ..       | N. W.                  | ☼ scattered        |
| 24                             | 29.593     | 65.5         | 66.6    | 55.6      | ..                   | ..       | N.                     | Clear              |
| 25                             | 29.605     | 64.0         | 66.0    | 56.0      | ..                   | ..       | N.                     | ☼ all over         |
| 26                             | 29.631     | 68.0         | 69.5    | 55.3      | ..                   | ..       | N. W.                  | ☼ scattered        |
| 27                             | 29.613     | 65.7         | 68.0    | 53.8      | ..                   | ..       | N. W.                  | Clear              |
| 28                             | 29.717     | 67.0         | 69.0    | 53.5      | ..                   | ..       | W.                     | Ditto              |
| 29                             | 29.633     | 68.0         | 70.2    | 53.0      | ..                   | ..       | W.                     | Ditto              |
| 30                             | 29.609     | 66.5         | 68.4    | 51.4      | ..                   | ..       | N. W.                  | Ditto              |
| 31                             | 29.605     | 65.8         | 67.5    | 52.0      | ..                   | ..       | N. W.                  | Ditto              |
| Mean.                          | 29.591     | 68.0         | 69.1    | 55.7      | ..                   | ..       | ..                     | ..                 |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of December, 1853.*

Minimum pressure observed at 4 p. m.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.     | Rain Gauges.                 |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|------------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                        | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.507     | 74.5         | 74.5    | 59.2      | 55.5                 | 55.5     | 64.5  | ↘ to E. and N.         | ..                           | W.                     |
| 2     | 29.507     | 75.5         | 74.5    | 59.8      | 74.0                 | 55.7     | 64.85 | ↘ scattered            | ..                           | S. E.                  |
| 3     | 29.569     | 76.2         | 75.0    | 61.6      | 75.2                 | 57.0     | 66.1  | Clear                  | ..                           | S. E.                  |
| 4     | 29.505     | 76.5         | 75.6    | 60.2      | 76.0                 | 55.5     | 65.75 | Ditto                  | ..                           | E.                     |
| 5     | 29.483     | 77.7         | 76.6    | 60.0      | 75.5                 | 54.8     | 65.15 | Ditto                  | ..                           | N. W.                  |
| 6     | 29.505     | 75.5         | 73.7    | 56.4      | 73.5                 | 56.0     | 64.75 | ↘ scattered towards W. | ..                           | N. W.                  |
| 7     | 29.477     | 73.8         | 72.5    | 56.0      | 71.5                 | 48.5     | 60.0  | Clear                  | ..                           | N. W.                  |
| 8     | 29.499     | 70.0         | 69.5    | 54.3      | 71.0                 | 48.3     | 59.65 | Ditto                  | ..                           | N. W.                  |
| 9     | 29.473     | 70.6         | 71.2    | 56.9      | 71.0                 | 48.9     | 59.95 | Ditto                  | ..                           | N. W.                  |
| 10    | 29.493     | 71.2         | 72.0    | 57.6      | 72.0                 | 54.5     | 63.25 | Ditto                  | ..                           | N. W.                  |
| 11    | 29.563     | 78.0         | 76.0    | 60.5      | 76.5                 | 56.0     | 66.25 | Ditto                  | ..                           | N. W.                  |
| 12    | 29.505     | 75.8         | 75.0    | 56.0      | 75.0                 | 56.0     | 65.50 | Ditto                  | ..                           | W.                     |
| 13    | 29.549     | 76.8         | 76.0    | 58.0      | 77.0                 | 56.0     | 65.5  | Ditto [W.              | ..                           | N.                     |
| 14    | 29.497     | 76.6         | 74.0    | 60.0      | 73.0                 | 55.0     | 64.0  | ↘ a few to             | ..                           | W.                     |
| 15    | 29.535     | 77.7         | 74.5    | 61.6      | 74.5                 | 55.0     | 64.75 | Clear                  | ..                           | W.                     |
| 16    | 29.529     | 78.9         | 76.9    | 61.0      | 76.0                 | 54.5     | 65.25 | Ditto                  | ..                           | W.                     |
| 17    | 29.567     | 75.5         | 72.9    | 60.3      | 72.5                 | 57.0     | 64.75 | Ditto                  | ..                           | N. E.                  |
| 18    | 29.512     | 77.2         | 75.4    | 58.9      | 74.0                 | 56.0     | 65.0  | Ditto                  | ..                           | N.                     |
| 19    | 29.541     | 75.6         | 73.0    | 57.7      | 73.1                 | 50.8     | 61.95 | ↘ to W.                | ..                           | W.                     |
| 20    | 29.533     | 76.0         | 73.9    | 55.0      | 74.0                 | 50.0     | 62.0  | Clear                  | ..                           | N. W.                  |
| 21    | 29.539     | 76.0         | 74.0    | 57.0      | 73.0                 | 52.0     | 62.5  | Ditto                  | ..                           | W.                     |
| 22    | 29.593     | 76.0         | 73.6    | 58.0      | 73.0                 | 49.0     | 61.0  | Ditto                  | ..                           | W.                     |
| 23    | 29.619     | 75.0         | 72.9    | 57.3      | 71.8                 | 51.0     | 61.4  | ↘ scattered            | ..                           | N. W.                  |
| 24    | 29.563     | 76.5         | 74.9    | 60.0      | 73.8                 | 50.0     | 61.9  | Clear                  | ..                           | N.                     |
| 25    | 29.569     | 75.0         | 74.0    | 58.0      | 73.0                 | 50.5     | 61.75 | ↘ all over             | ..                           | N.                     |
| 26    | 29.605     | 74.5         | 73.8    | 57.2      | 72.8                 | 50.0     | 61.4  | ↘ scattered            | ..                           | N. W.                  |
| 27    | 29.571     | 70.7         | 70.0    | 53.0      | 70.0                 | 52.0     | 61.0  | Clear                  | ..                           | N. W.                  |
| 28    | 29.701     | 76.0         | 73.4    | 57.3      | 73.0                 | 52.0     | 62.5  | Ditto                  | ..                           | N.                     |
| 29    | 29.601     | 76.0         | 74.0    | 56.0      | 74.2                 | 51.0     | 62.6  | Ditto                  | ..                           | W.                     |
| 30    | 29.589     | 75.0         | 73.1    | 55.3      | 72.2                 | 49.0     | 60.6  | Ditto                  | ..                           | N. W.                  |
| 31    | 29.587     | 75.0         | 73.0    | 55.0      | 73.0                 | 47.5     | 60.25 | Ditto                  | ..                           | N. W.                  |
| Mn.   | 29.545     | 75.3         | 73.9    | 57.6      | 73.2                 | 52.7     | 63.1  | ..                     | ..                           | ..                     |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of January, 1854.*

| Maximum pressure observed at 9.50 A. M. |            |              |         |           |                      |          |                        |                    |
|-----------------------------------------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------|
| Date.                                   | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky. |
|                                         |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                    |
| 1                                       | 29.589     | 59.8         | 61.8    | 50.0      | ..                   | ..       | N. W.                  | Clear              |
| 2                                       | 29.575     | 60.8         | 62.5    | 51.4      | ..                   | ..       | N. W.                  | Ditto              |
| 3                                       | 29.583     | 61.7         | 63.0    | 53.0      | ..                   | ..       | E.                     | scattered          |
| 4                                       | 29.605     | 59.5         | 61.3    | 51.3      | ..                   | ..       | W.                     | Clear              |
| 5                                       | 29.663     | 58.5         | 60.0    | 51.0      | ..                   | ..       | W.                     | Ditto              |
| 6                                       | 29.685     | 61.0         | 62.9    | 53.7      | ..                   | ..       | S. E.                  | scattered          |
| 7                                       | 29.669     | 62.0         | 64.2    | 56.0      | ..                   | ..       | W.                     | Clear              |
| 8                                       | 29.649     | 62.3         | 64.5    | 56.0      | ..                   | ..       | W.                     | Ditto              |
| 9                                       | 29.643     | 60.5         | 61.8    | 49.0      | ..                   | ..       | N. W.                  | Ditto              |
| 10                                      | 29.715     | 66.5         | 67.5    | 54.0      | ..                   | ..       | N. W.                  | Ditto              |
| 11                                      | 29.693     | 60.8         | 61.6    | 52.0      | ..                   | ..       | N. W.                  | scattered          |
| 12                                      | 29.629     | 65.0         | 66.5    | 54.0      | ..                   | ..       | N. W.                  | Ditto              |
| 13                                      | 29.671     | 61.5         | 63.0    | 52.9      | ..                   | ..       | N.                     | Clear              |
| 14                                      | 29.651     | 61.7         | 62.5    | 52.8      | ..                   | ..       | W.                     | a few scattered    |
| 15                                      | 29.637     | 61.0         | 62.0    | 52.0      | ..                   | ..       | N. W.                  | Clear              |
| 16                                      | 29.691     | 59.9         | 61.9    | 52.0      | ..                   | ..       | N.                     | Ditto              |
| 17                                      | 29.611     | 60.5         | 62.6    | 49.2      | ..                   | ..       | N. W.                  | Ditto              |
| 18                                      | 29.625     | 59.0         | 60.5    | 48.9      | ..                   | ..       | N. W.                  | Ditto              |
| 19                                      | 29.585     | 60.7         | 62.0    | 49.2      | ..                   | ..       | N. W.                  | Ditto              |
| 20                                      | 29.577     | 61.5         | 64.1    | 52.0      | ..                   | ..       | N. W.                  | Ditto              |
| 21                                      | 29.605     | 63.0         | 65.5    | 52.4      | ..                   | ..       | W.                     | Ditto              |
| 22                                      | 29.651     | 63.5         | 65.0    | 52.7      | ..                   | ..       | W.                     | Ditto              |
| 23                                      | 29.637     | 63.0         | 66.0    | 54.0      | ..                   | ..       | W.                     | Ditto              |
| 24                                      | 29.609     | 62.0         | 63.4    | 53.0      | ..                   | ..       | W.                     | a few scattered    |
| 25                                      | 29.605     | 63.0         | 64.5    | 54.0      | ..                   | ..       | N. W.                  | Clear              |
| 26                                      | 29.591     | 66.5         | 70.2    | 59.9      | ..                   | ..       | E.                     | Ditto              |
| 27                                      | 29.611     | 71.6         | 72.4    | 60.6      | ..                   | ..       | E.                     | Ditto              |
| 28                                      | 29.539     | 71.9         | 73.6    | 61.5      | ..                   | ..       | S. E.                  | scattered          |
| 29                                      | 29.569     | 71.6         | 73.0    | 61.6      | ..                   | ..       | E.                     | a few scattered    |
| 30                                      | 29.473     | 69.9         | 69.0    | 65.0      | ..                   | ..       | N. W.                  | all over           |
| 31                                      | 29.567     | 59.5         | 59.0    | 53.0      | ..                   | ..       | N. W.                  | Ditto              |
| Mean.                                   | 29.619     | 63.9         | 64.4    | 53.5      | ..                   | ..       | ..                     | ..                 |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of January, 1854.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.         |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                            |
| 1     | 29.553     | 64.8         | 67.0    | 50.9      | ..                   | ..       | N. W.                  | Clear                      |
| 2     | 29.519     | 65.9         | 66.9    | 52.5      | ..                   | ..       | W.                     | Ditto                      |
| 3     | 29.533     | 65.8         | 67.0    | 54.5      | ..                   | ..       | S. E.                  | Ditto                      |
| 4     | 29.565     | 63.8         | 64.1    | 52.0      | ..                   | ..       | W.                     | Ditto                      |
| 5     | 29.571     | 63.0         | 64.5    | 53.0      | ..                   | ..       | W.                     | Ditto                      |
| 6     | 29.645     | 65.0         | 66.8    | 55.3      | ..                   | ..       | S. E.                  | ~ scattered                |
| 7     | 29.631     | 66.2         | 67.4    | 56.5      | ..                   | ..       | W.                     | Clear                      |
| 8     | 29.605     | 66.8         | 67.5    | 56.5      | ..                   | ..       | W.                     | Ditto                      |
| 9     | 29.605     | 66.9         | 67.2    | 52.0      | ..                   | ..       | N. W.                  | Ditto                      |
| 10    | 29.685     | 71.5         | 72.7    | 54.5      | ..                   | ..       | N. W.                  | Ditto                      |
| 11    | 29.655     | 66.0         | 66.9    | 53.0      | ..                   | ..       | N. W.                  | ~ scattered                |
| 12    | 29.613     | 65.9         | 66.2    | 54.8      | ..                   | ..       | N. W.                  | Ditto                      |
| 13    | 29.655     | 69.2         | 69.4    | 54.6      | ..                   | ..       | N.                     | ~ ditto                    |
| 14    | 29.605     | 65.0         | 66.2    | 54.6      | ..                   | ..       | W.                     | Clear                      |
| 15    | 29.591     | 66.0         | 67.2    | 55.0      | ..                   | ..       | N. W.                  | Ditto                      |
| 16    | 29.655     | 66.5         | 68.4    | 52.2      | ..                   | ..       | N.                     | Ditto                      |
| 17    | 29.571     | 56.5         | 67.2    | 51.2      | ..                   | ..       | N. W.                  | Ditto                      |
| 18    | 29.550     | 65.0         | 66.2    | 50.7      | ..                   | ..       | N. W.                  | Ditto                      |
| 19    | 29.545     | 67.0         | 68.1    | 52.2      | ..                   | ..       | N. W.                  | Ditto                      |
| 20    | 29.535     | 68.0         | 71.0    | 54.0      | ..                   | ..       | W.                     | Ditto                      |
| 21    | 29.545     | 66.0         | 67.4    | 53.5      | ..                   | ..       | W.                     | Ditto                      |
| 22    | 29.567     | 65.9         | 67.0    | 53.2      | ..                   | ..       | W.                     | Ditto                      |
| 23    | 29.607     | 69.5         | 70.8    | 54.5      | ..                   | ..       | W.                     | Ditto                      |
| 24    | 29.594     | 63.6         | 64.5    | 54.0      | ..                   | ..       | N. W.                  | ~ a few scattered          |
| 25    | 29.559     | 71.5         | 73.3    | 59.8      | ..                   | ..       | W.                     | Clear                      |
| 26    | 29.555     | 72.3         | 73.8    | 60.3      | ..                   | ..       | E.                     | Ditto                      |
| 27    | 29.547     | 79.0         | 80.0    | 63.3      | ..                   | ..       | E.                     | Ditto                      |
| 28    | 29.491     | 76.4         | 79.9    | 63.2      | ..                   | ..       | S. E.                  | Ditto                      |
| 29    | 29.493     | 76.2         | 79.6    | 63.5      | ..                   | ..       | E.                     | ~ to E. W. and S.          |
| 30    | 29.435     | 72.0         | 72.0    | 61.5      | ..                   | ..       | N. W.                  | ~ all over                 |
| 31    | 29.521     | 63.6         | 63.3    | 57.2      | ..                   | ..       | N. W.                  | ~ to E. and S. in horizon. |
| Mean. | 29.574     | 67.8         | 69.0    | 55.3      | ..                   | ..       | ..                     | ..                         |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of Jan. 1853.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.    | Rain Gauges.                 |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|-----------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                       | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.493     | 74.6         | 74.0    | 53.0      | 74.0                 | 47.0     | 60.5  | Clear                 | ..                           | N.W.                   |
| 2     | 29.523     | 71.5         | 69.0    | 55.0      | 70.0                 | 47.0     | 51.1  | scattered             | ..                           | W.                     |
| 3     | 29.509     | 71.3         | 69.0    | 54.7      | 69.0                 | 51.5     | 60.25 | Clear                 | ..                           | S.                     |
| 4     | 29.559     | 71.5         | 70.0    | 55.9      | 69.5                 | 46.8     | 58.65 | Ditto                 | ..                           | W.                     |
| 5     | 29.547     | 70.0         | 69.0    | 56.0      | 69.0                 | 49.5     | 59.25 | Ditto                 | ..                           | W.                     |
| 6     | 29.609     | 71.0         | 68.6    | 57.0      | 69.0                 | 51.5     | 60.25 | to E.                 | ..                           | S. E.                  |
| 7     | 29.493     | 76.6         | 74.0    | 57.7      | 72.0                 | 53.8     | 62.9  | Clear                 | ..                           | W.                     |
| 8     | 29.561     | 75.2         | 74.0    | 56.0      | 73.2                 | 51.2     | 62.2  | Ditto                 | ..                           | W.                     |
| 9     | 29.577     | 75.6         | 74.9    | 56.5      | 74.0                 | 49.5     | 61.75 | Ditto                 | ..                           | N.W.                   |
| 10    | 29.625     | 77.0         | 75.6    | 58.5      | 75.0                 | 49.0     | 62.0  | Ditto                 | ..                           | W.                     |
| 11    | 29.591     | 75.0         | 74.0    | 56.0      | 74.0                 | 51.0     | 62.5  | scattered             | ..                           | N.W.                   |
| 12    | 29.587     | 70.5         | 69.6    | 50.0      | 72.0                 | 50.8     | 61.4  | all over              | ..                           | N.W.                   |
| 13    | 29.591     | 72.5         | 71.5    | 57.7      | 71.0                 | 53.0     | 62.0  | a few in horizon      | ..                           | N.                     |
| 14    | 29.597     | 73.0         | 72.0    | 57.9      | 71.6                 | 51.0     | 61.3  | Clear                 | ..                           | W.                     |
| 15    | 29.525     | 73.0         | 72.0    | 56.0      | 72.2                 | 50.0     | 61.1  | Ditto                 | ..                           | W.                     |
| 16    | 29.615     | 73.0         | 72.0    | 54.5      | 71.6                 | 49.5     | 60.55 | Ditto                 | ..                           | N.                     |
| 17    | 29.537     | 72.0         | 72.0    | 53.5      | 71.0                 | 49.9     | 60.45 | Ditto                 | ..                           | N.W.                   |
| 18    | 29.541     | 71.0         | 71.0    | 52.9      | 70.0                 | 50.0     | 60.0  | Ditto                 | ..                           | N.W.                   |
| 19    | 29.489     | 74.0         | 73.5    | 55.2      | 72.8                 | 49.0     | 60.9  | Ditto                 | ..                           | N.W.                   |
| 20    | 29.505     | 74.0         | 72.9    | 52.9      | 73.9                 | 51.0     | 62.45 | Ditto                 | ..                           | W.                     |
| 21    | 29.515     | 74.2         | 73.5    | 54.0      | 74.0                 | 51.0     | 62.5  | Ditto                 | ..                           | W.                     |
| 22    | 29.493     | 73.8         | 73.0    | 53.6      | 74.3                 | 51.2     | 62.75 | Ditto                 | ..                           | W.                     |
| 23    | 29.571     | 75.0         | 76.2    | 57.0      | 76.0                 | 51.0     | 63.5  | Ditto                 | ..                           | W.                     |
| 24    | 29.547     | 67.0         | 69.5    | 57.5      | 70.0                 | 54.0     | 62.0  | scattered             | ..                           | W.                     |
| 25    | 29.499     | 75.5         | 76.7    | 59.7      | 75.8                 | 56.0     | 65.9  | Clear                 | ..                           | W.                     |
| 26    | 29.507     | 79.9         | 79.8    | 64.0      | 80.0                 | 52.0     | 66.0  | Ditto                 | ..                           | E.                     |
| 27    | 29.509     | 82.0         | 82.4    | 65.0      | 81.5                 | 61.0     | 71.25 | Ditto                 | ..                           | N. E.                  |
|       |            |              |         |           | 83.2                 | 60.5     | 71.85 | in hor. to S. E. & W. | ..                           | S. E.                  |
| 28    | 29.413     | 83.6         | 83.2    | 65.5      |                      |          |       | scattered             | ..                           | E.                     |
| 29    | 29.421     | 83.5         | 83.0    | 65.7      | 83.0                 | 64.0     | 73.5  | all over              | ..                           | N.W.                   |
| 30    | 29.489     | 75.6         | 74.8    | 62.7      | 74.6                 | 63.6     | 69.1  | to E. and S. in hor.  | ..                           | N.W.                   |
| 31    | 29.509     | 69.5         | 66.9    | 55.8      | 66.5                 | 58.2     | 62.35 |                       | 0.5                          | N.W.                   |
| Mn.   | 29.531     | 74.3         | 73.5    | 57.0      | 73.3                 | 52.4     | 62.8  | ..                    | 0.5                          | ..                     |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of February, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.561     | 57.7         | 57.9    | 46.0      | ..                   | ..       | N. W.                  | ✓ scattered          |
| 2     | 29.479     | 54.9         | 55.3    | 45.4      | ..                   | ..       | N. W.                  | Clear                |
| 3     | 29.521     | 57.5         | 58.5    | 47.4      | ..                   | ..       | W.                     | Ditto                |
| 4     | 29.525     | 59.7         | 61.0    | 50.5      | ..                   | ..       | S. E.                  | ✓ all over           |
| 5     | 29.569     | 59.8         | 60.2    | 50.5      | ..                   | ..       | E.                     | ✓ scattered          |
| 6     | 29.565     | 58.9         | 59.5    | 50.0      | ..                   | ..       | W.                     | Clear                |
| 7     | 29.633     | 57.3         | 59.0    | 49.5      | ..                   | ..       | W.                     | Ditto                |
| 8     | 29.621     | 64.0         | 66.0    | 62.0      | ..                   | ..       | ..                     | ✓ scattered          |
| 9     | 29.491     | 65.0         | 67.3    | 53.4      | ..                   | ..       | N. W.                  | Clear                |
| 10    | 29.355     | 69.0         | 69.3    | 58.5      | ..                   | ..       | E.                     | Hazy                 |
| 11    | 29.495     | 62.7         | 64.5    | 55.5      | ..                   | ..       | E.                     | Clear                |
| 12    | 29.483     | 63.5         | 64.2    | 54.6      | ..                   | ..       | E.                     | ✓ scattered          |
| 13    | 29.475     | 65.0         | 67.0    | 54.3      | ..                   | ..       | E.                     | ✓ all over           |
| 14    | 29.415     | 62.5         | 63.0    | 57.4      | ..                   | ..       | S. E.                  | Clear                |
| 15    | 29.571     | 65.0         | 66.0    | 59.0      | ..                   | ..       | E.                     | ✓ very few scattered |
| 16    | 29.594     | 67.7         | 69.0    | 58.5      | ..                   | ..       | S. E.                  | ✓ scattered          |
| 17    | 29.663     | 67.7         | 69.3    | 57.7      | ..                   | ..       | E.                     | Clear                |
| 18    | 29.765     | 65.0         | 66.0    | 61.6      | ..                   | ..       | E.                     | ✓ to E. and N.       |
| 19    | 29.661     | 65.6         | 65.9    | 61.0      | ..                   | ..       | W.                     | Clear                |
| 20    | 29.639     | 65.5         | 65.5    | 62.0      | ..                   | ..       | N. W.                  | ✓ scattered all over |
| 21    | 29.647     | 67.8         | 68.5    | 58.2      | ..                   | ..       | N. W.                  | ✓ scattered          |
| 22    | 29.605     | 64.6         | 65.2    | 58.0      | ..                   | ..       | E.                     | ✓ a few scattered    |
| 23    | 29.591     | 65.3         | 66.2    | 62.2      | ..                   | ..       | E.                     | ✓ all over           |
| 24    | 29.627     | 67.8         | 68.0    | 62.0      | ..                   | ..       | E.                     | Hazy to E.           |
| 25    | 29.547     | 70.0         | 70.4    | 62.5      | ..                   | ..       | N.                     | ✓ scattered          |
| 26    | 29.507     | 68.0         | 68.5    | 60.0      | ..                   | ..       | E.                     | ✓ scattered          |
| 27    | 29.467     | 68.5         | 69.0    | 58.2      | ..                   | ..       | N. W.                  | Clear                |
| 28    | 29.433     | 71.5         | 72.5    | 58.0      | ..                   | ..       | N. W.                  | Ditto                |
| Mean. | 2.9554     | 64.2         | 65.1    | 56.2      | ..                   | ..       | ..                     | ..                   |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of Feb. 1854.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.    |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|-----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                       |
| 1     | 29.531     | 62.0         | 62.2    | 48.4      | ..                   | ..       | N. W.                  | ~ scattered           |
| 2     | 29.439     | 60.0         | 60.7    | 49.5      | ..                   | ..       | N. W.                  | Clear                 |
| 3     | 29.483     | 61.9         | 62.4    | 50.6      | ..                   | ..       | W.                     | Ditto                 |
| 4     | 29.497     | 62.3         | 64.0    | 51.7      | ..                   | ..       | S. E.                  | ~ all over            |
| 5     | 29.523     | 64.0         | 64.6    | 51.0      | ..                   | ..       | E.                     | ~ scattered           |
| 6     | 29.505     | 63.9         | 63.9    | 49.2      | ..                   | ..       | W.                     | Ditto                 |
| 7     | 29.599     | 64.0         | 66.3    | 50.8      | ..                   | ..       | W.                     | Clear                 |
| 8     | 29.577     | 68.0         | 69.0    | 51.5      | ..                   | ..       | ..                     | Ditto                 |
| 9     | 29.431     | 69.0         | 70.8    | 53.9      | ..                   | ..       | S. W.                  | Ditto                 |
| 10    | 29.339     | 70.9         | 70.7    | 60.5      | ..                   | ..       | W.                     | Ditto                 |
| 11    | 29.431     | 64.0         | 64.0    | 57.0      | ..                   | ..       | E                      | Ditto                 |
| 12    | 29.445     | 68.0         | 69.4    | 56.0      | ..                   | ..       | E.                     | ~ scattered           |
| 13    | 29.435     | 69.8         | 71.0    | 56.2      | ..                   | ..       | N. W.                  | ~ all over            |
| 14    | 29.401     | 64.8         | 65.5    | 58.8      | ..                   | ..       | S. E.                  | Clear                 |
| 15    | 29.539     | 67.6         | 68.4    | 58.4      | ..                   | ..       | E.                     | ~ very few scattered  |
| 16    | 29.561     | 69.0         | 70.8    | 59.5      | ..                   | ..       | S. E.                  | ~ scattered           |
| 17    | 29.645     | 72.5         | 73.8    | 60.5      | ..                   | ..       | S.S.E.                 | ~ ditto               |
| 18    | 29.725     | 70.0         | 70.3    | 62.1      | ..                   | ..       | N. W.                  | Clear                 |
| 19    | 29.627     | 70.8         | 71.0    | 61.9      | ..                   | ..       | W.                     | Ditto                 |
| 20    | 29.601     | 68.0         | 68.3    | 63.2      | ..                   | ..       | N. W.                  | ~ scattered all over  |
| 21    | 29.605     | 70.6         | 71.4    | 59.1      | ..                   | ..       | N. W.                  | ~ scattered           |
| 22    | 29.575     | 69.5         | 70.3    | 60.5      | ..                   | ..       | E.                     | ~ all over            |
| 23    | 29.567     | 68.5         | 68.7    | 63.4      | ..                   | ..       | E.                     | ~ scattered           |
| 24    | 29.587     | 71.5         | 72.3    | 63.4      | ..                   | ..       | W.                     | ~ scattered           |
| 25    | 29.455     | 73.0         | 73.5    | 64.0      | ..                   | ..       | N. E.                  | ~ ditto               |
| 26    | 29.493     | 69.9         | 70.2    | 61.2      | ..                   | ..       | N. E.                  | ~ ditto               |
| 27    | 29.445     | 73.0         | 73.3    | 57.4      | ..                   | ..       | W.                     | ~ scattered in zenith |
| 28    | 29.411     | 76.5         | 77.5    | 59.5      | ..                   | ..       | N. W.                  | Clear                 |
| Mean. | 29.517     | 68.0         | 68.7    | 57.1      | ..                   | ..       | ..                     | ..                    |



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of Feb. 1854.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.   | Rain Gauges.                 |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|----------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                      | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.455     | 67.0         | 66.0    | 50.5      | 66.0                 | 51.0     | 58.5  | ~ scattered          | ..                           | N.W.                   |
| 2     | 29.405     | 64.0         | 64.6    | 49.6      | 64.0                 | 44.5     | 54.25 | Clear                | ..                           | N.W.                   |
| 3     | 29.445     | 68.0         | 68.0    | 51.5      | 67.0                 | 45.0     | 56.0  | Ditto                | ..                           | N.W.                   |
| 4     | 29.429     | 66.0         | 66.5    | 52.5      | 66.0                 | 45.0     | 55.5  | ~ all over           | ..                           | S. E.                  |
| 5     | 29.473     | 67.5         | 67.0    | 53.0      | 67.0                 | 46.0     | 56.5  | ~ scattered          | ..                           | E.                     |
| 6     | 29.465     | 67.9         | 67.6    | 52.0      | 68.2                 | 46.0     | 57.1  | Ditto                | ..                           | W.                     |
| 7     | 29.567     | 69.0         | 68.6    | 54.0      | 68.0                 | 47.5     | 57.75 | Clear                | ..                           | W.                     |
| 8     | 29.505     | 74.0         | 73.0    | 53.6      | 73.6                 | 49.5     | 61.05 | Ditto                | ..                           | W.                     |
| 9     | 29.403     | 76.0         | 75.4    | 57.4      | 75.0                 | 53.0     | 64.0  | ~ all over           | ..                           | S. W.                  |
| 10    | 29.329     | 73.2         | 73.0    | 60.8      | 72.8                 | 53.0     | 62.9  | Clear                | ..                           | W.                     |
| 11    | 29.391     | 71.6         | 71.2    | 59.5      | 71.0                 | 51.0     | 61.0  | Ditto                | ..                           | E.                     |
| 12    | 29.405     | 75.0         | 74.6    | 57.2      | 72.2                 | 51.0     | 61.6  | ~ scattered          | ..                           | E.                     |
| 13    | 29.325     | 67.7         | 67.0    | 55.3      | 69.5                 | 56.0     | 62.75 | Ditto                | ..                           | E.                     |
| 14    | 29.329     | 66.0         | 66.9    | 59.6      | 66.5                 | 51.0     | 58.75 | ~ to N. and W.       | ..                           | S. E.                  |
| 15    | 29.455     | 71.5         | 71.5    | 58.5      | 71.0                 | 52.0     | 61.5  | ~ scattered          | ..                           | S. E.                  |
| 16    | 29.505     | 72.2         | 72.0    | 60.2      | 72.0                 | 56.5     | 64.25 | ~ ditto              | ..                           | S. E.                  |
| 17    | 29.605     | 74.2         | 74.9    | 61.8      | 74.0                 | 60.0     | 67.0  | ~ ditto              | ..                           | S. E.                  |
| 18    | 29.699     | 75.5         | 75.8    | 63.3      | 77.0                 | 64.5     | 70.75 | Clear                | ..                           | N.W.                   |
| 19    | 29.591     | 75.9         | 76.2    | 62.6      | 76.0                 | 62.6     | 69.3  | Ditto                | ..                           | W.                     |
| 20    | 29.539     | 72.6         | 72.6    | 64.6      | 72.6                 | 57.5     | 65.05 | ~ scattered all over | ..                           | N.W.                   |
| 21    | 29.513     | 74.8         | 74.2    | 60.0      | 75.0                 | 57.5     | 66.25 | ~ scattered          | ..                           | S. E.                  |
| 22    | 29.535     | 71.0         | 71.0    | 59.0      | 74.0                 | 62.8     | 68.4  | ~ all over           | ..                           | E.                     |
| 23    | 29.525     | 72.4         | 72.0    | 63.8      | 71.5                 | 60.0     | 65.75 | Ditto                | ..                           | E.                     |
| 24    | 29.521     | 75.6         | 75.4    | 65.1      | 75.0                 | 61.0     | 68.0  | ~ scattered          | ..                           | N.W.                   |
| 25    | 29.405     | 76.7         | 76.7    | 66.5      | 76.5                 | 65.0     | 70.75 | Ditto                | ..                           | N. E.                  |
| 26    | 29.437     | 74.0         | 75.4    | 64.0      | 75.5                 | 62.6     | 69.05 | Ditto                | ..                           | N. E.                  |
| 27    | 29.375     | 79.0         | 78.0    | 61.0      | 78.0                 | 59.0     | 68.5  | Clear                | ..                           | N.W.                   |
| 28    | 29.351     | 82.7         | 83.0    | 63.8      | 82.2                 | 73.0     | 77.6  | Ditto                | ..                           | N.W.                   |
| Mn.   | 29.464     | 72.2         | 72.1    | 58.6      | 72.0                 | 55.1     | 63.5  | ..                   | ..                           | ..                     |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of February, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fah. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempe-<br>rature during<br>the day. |      |       |
|-------|------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|--------------------------------------------------|------|-------|
|       |                                                | Max.                                      | Min.    | Diff.   |                               | Max.                                             | Min. | Diff. |
|       | Inches.                                        | Inches.                                   | Inches. | Inches. | o                             | o                                                | o    | o     |
| 1     | 29.908                                         | 29.995                                    | 29.819  | 0.176   | 72.2                          | 81.3                                             | 65.5 | 15.8  |
| 2     | .851                                           | .924                                      | .802    | .122    | 70.1                          | 75.0                                             | 66.6 | 8.4   |
| 3     | .912                                           | .985                                      | .841    | .144    | 66.6                          | 73.8                                             | 60.2 | 13.6  |
| 4     | .999                                           | 30.087                                    | .946    | .141    | 63.9                          | 74.0                                             | 55.1 | 18.9  |
| 5     | <i>Sunday.</i>                                 |                                           |         |         |                               |                                                  |      |       |
| 6     | .930                                           | .003                                      | .871    | .132    | 71.5                          | 80.2                                             | 66.2 | 14.0  |
| 7     | 30.018                                         | .113                                      | .964    | .149    | 68.1                          | 77.0                                             | 59.0 | 18.0  |
| 8     | .009                                           | .093                                      | .941    | .152    | 66.5                          | 76.8                                             | 57.0 | 19.8  |
| 9     | 29.943                                         | .031                                      | .877    | .154    | 67.4                          | 78.4                                             | 58.3 | 20.1  |
| 10    | .950                                           | .032                                      | .899    | .133    | 68.7                          | 79.9                                             | 59.2 | 20.7  |
| 11    | .943                                           | .031                                      | .883    | .148    | 69.1                          | 77.2                                             | 62.6 | 14.6  |
| 12    | <i>Sunday.</i>                                 |                                           |         |         |                               |                                                  |      |       |
| 13    | .935                                           | .033                                      | .873    | .160    | 68.3                          | 71.2                                             | 65.4 | 5.8   |
| 14    | .909                                           | 29.969                                    | .836    | .133    | 64.7                          | 67.4                                             | 63.0 | 4.4   |
| 15    | .960                                           | 30.037                                    | .905    | .132    | 67.1                          | 75.6                                             | 61.6 | 14.0  |
| 16    | 30.078                                         | .165                                      | 30.006  | .159    | 68.3                          | 78.0                                             | 59.4 | 18.6  |
| 17    | .148                                           | .242                                      | .088    | .154    | 69.5                          | 80.7                                             | 60.0 | 20.7  |
| 18    | .121                                           | .208                                      | .046    | .162    | 71.1                          | 82.4                                             | 61.2 | 21.2  |
| 19    | <i>Sunday.</i>                                 |                                           |         |         |                               |                                                  |      |       |
| 20    | .056                                           | .138                                      | 29.994  | .144    | 73.2                          | 83.6                                             | 62.8 | 20.8  |
| 21    | .010                                           | .105                                      | .941    | .164    | 73.6                          | 84.9                                             | 62.5 | 22.4  |
| 22    | .019                                           | .120                                      | .962    | .158    | 74.5                          | 85.6                                             | 65.4 | 20.2  |
| 23    | 29.989                                         | .073                                      | .910    | .163    | 76.3                          | 87.8                                             | 66.1 | 21.7  |
| 24    | .958                                           | .032                                      | .871    | .161    | 76.7                          | 85.8                                             | 68.5 | 17.3  |
| 25    | .929                                           | .016                                      | .878    | .138    | 76.9                          | 86.2                                             | 68.6 | 17.6  |
| 26    | <i>Sunday.</i>                                 |                                           |         |         |                               |                                                  |      |       |
| 27    | .797                                           | 29.878                                    | .741    | .137    | 73.9                          | 82.7                                             | 67.2 | 15.5  |
| 28    | .808                                           | .882                                      | .761    | .121    | 76.4                          | 86.5                                             | 67.4 | 19.1  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of February, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.—(Continued.)

| Date. | Mean Wet Bulb Ther-<br>moneter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 68.8                            | 3.5                 | 67.0                | 5.2                          | 0.660                            | 7.24                                             | 1.44                                                                    | 0.852                                                               |
| 2     | 67.4                            | 2.7                 | 65.9                | 4.2                          | .637                             | 7.01                                             | 1.03                                                                    | .876                                                                |
| 3     | 61.9                            | 4.7                 | 59.3                | 7.4                          | .512                             | 5.67                                             | 1.58                                                                    | .795                                                                |
| 4     | 59.3                            | 4.6                 | 56.5                | 7.3                          | .468                             | 5.20                                             | 1.54                                                                    | .792                                                                |
| 5     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 6     | 67.4                            | 4.1                 | 65.2                | 6.3                          | .622                             | 6.83                                             | 1.63                                                                    | .826                                                                |
| 7     | 62.7                            | 5.4                 | 59.6                | 8.5                          | .521                             | 5.75                                             | 1.91                                                                    | .762                                                                |
| 8     | 60.9                            | 5.6                 | 57.6                | 8.9                          | .485                             | 5.37                                             | 1.96                                                                    | .753                                                                |
| 9     | 62.6                            | 4.8                 | 59.8                | 7.5                          | .524                             | 5.79                                             | 1.76                                                                    | .787                                                                |
| 10    | 65.0                            | 3.7                 | 63.0                | 5.7                          | .582                             | 6.41                                             | 1.47                                                                    | .838                                                                |
| 11    | 66.8                            | 2.3                 | 65.6                | 3.6                          | .631                             | 6.95                                             | 0.92                                                                    | .891                                                                |
| 12    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 13    | 66.4                            | 1.9                 | 65.3                | 2.9                          | .625                             | 6.90                                             | 0.70                                                                    | .909                                                                |
| 14    | 63.6                            | 1.1                 | 62.9                | 1.8                          | .576                             | 6.41                                             | 0.39                                                                    | .943                                                                |
| 15    | 65.1                            | 2.0                 | 64.0                | 3.1                          | .599                             | 6.63                                             | 0.76                                                                    | .904                                                                |
| 16    | 65.2                            | 3.1                 | 63.5                | 4.8                          | .591                             | 6.52                                             | 1.22                                                                    | .861                                                                |
| 17    | 65.6                            | 3.9                 | 63.4                | 6.1                          | .590                             | 6.49                                             | 1.56                                                                    | .827                                                                |
| 18    | 66.9                            | 4.2                 | 64.7                | 6.4                          | .615                             | 6.74                                             | 1.72                                                                    | .821                                                                |
| 19    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 20    | 68.7                            | 4.5                 | 66.4                | 6.8                          | .649                             | 7.09                                             | 1.90                                                                    | .811                                                                |
| 21    | 68.8                            | 4.8                 | 66.4                | 7.2                          | .649                             | 7.09                                             | 2.03                                                                    | .800                                                                |
| 22    | 69.7                            | 4.8                 | 67.2                | 7.2                          | .667                             | 7.27                                             | 2.08                                                                    | .802                                                                |
| 23    | 71.3                            | 5.0                 | 68.7                | 7.6                          | .701                             | 7.61                                             | 2.29                                                                    | .790                                                                |
| 24    | 72.3                            | 4.4                 | 70.1                | 6.6                          | .733                             | 7.95                                             | 1.99                                                                    | .811                                                                |
| 25    | 71.6                            | 5.2                 | 69.0                | 7.8                          | .706                             | 7.66                                             | 2.33                                                                    | .786                                                                |
| 26    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 27    | 70.7                            | 3.3                 | 69.0                | 5.0                          | .706                             | 7.70                                             | 1.44                                                                    | .856                                                                |
| 28    | 71.4                            | 4.9                 | 68.9                | 7.4                          | .704                             | 7.65                                             | 2.25                                                                    | .799                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of February, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 29.967                                    | 30.161                                                 | 29.802  | 0.359   | 66.8                       | 73.6                                                     | 59.1 | 14.5  |
| 1          | .957                                      | .146                                                   | .794    | .352    | 66.0                       | 72.5                                                     | 58.2 | 14.3  |
| 2          | .950                                      | .141                                                   | .784    | .357    | 65.6                       | 72.2                                                     | 57.6 | 14.6  |
| 3          | .937                                      | .128                                                   | .771    | .357    | 64.9                       | 71.0                                                     | 56.8 | 14.2  |
| 4          | .933                                      | .115                                                   | .759    | .356    | 64.4                       | 69.7                                                     | 56.1 | 13.6  |
| 5          | .941                                      | .127                                                   | .754    | .373    | 64.0                       | 69.2                                                     | 55.9 | 13.3  |
| 6          | .956                                      | .143                                                   | .763    | .380    | 63.5                       | 68.6                                                     | 55.1 | 13.5  |
| 7          | .984                                      | .172                                                   | .800    | .372    | 63.2                       | 68.7                                                     | 55.1 | 13.6  |
| 8          | 30.012                                    | .205                                                   | .823    | .382    | 65.6                       | 72.4                                                     | 57.7 | 14.7  |
| 9          | .036                                      | .232                                                   | .860    | .372    | 69.3                       | 76.6                                                     | 61.4 | 15.2  |
| 10         | .048                                      | .242                                                   | .878    | .364    | 72.3                       | 79.0                                                     | 66.3 | 12.7  |
| 11         | .037                                      | .228                                                   | .869    | .359    | 74.4                       | 81.3                                                     | 67.4 | 13.9  |
| Noon.      | .012                                      | .202                                                   | .852    | .350    | 76.5                       | 84.2                                                     | 66.4 | 17.8  |
| 1          | 29.977                                    | .167                                                   | .812    | .355    | 78.1                       | 85.4                                                     | 66.1 | 19.3  |
| 2          | .943                                      | .129                                                   | .785    | .344    | 78.7                       | 87.0                                                     | 66.0 | 21.0  |
| 3          | .923                                      | .106                                                   | .766    | .340    | 79.3                       | 87.8                                                     | 65.6 | 22.2  |
| 4          | .912                                      | .095                                                   | .751    | .344    | 79.1                       | 87.4                                                     | 64.8 | 22.6  |
| 5          | .911                                      | .089                                                   | .741    | .348    | 77.9                       | 85.8                                                     | 64.2 | 21.6  |
| 6          | .920                                      | .088                                                   | .742    | .346    | 75.2                       | 83.7                                                     | 64.2 | 19.5  |
| 7          | .935                                      | .107                                                   | .753    | .354    | 72.8                       | 80.1                                                     | 63.8 | 16.3  |
| 8          | .953                                      | .133                                                   | .774    | .359    | 71.1                       | 78.4                                                     | 63.6 | 14.8  |
| 9          | .973                                      | .159                                                   | .794    | .365    | 69.7                       | 77.4                                                     | 62.8 | 14.6  |
| 10         | .982                                      | .168                                                   | .812    | .356    | 68.7                       | 76.8                                                     | 61.6 | 15.2  |
| 11         | .981                                      | .176                                                   | .806    | .370    | 67.6                       | 75.0                                                     | 60.2 | 14.8  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of February, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.—(Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|                | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| Mid-<br>night. | 64.7                            | 2.0                 | 63.5                | 3.2                          | 0.592                            | 6.55                                             | 0.73                                                                    | 0.900                                                               |
| 1              | 64.2                            | 1.8                 | 63.1                | 2.9                          | .584                             | .47                                              | .65                                                                     | .910                                                                |
| 2              | 63.8                            | 1.7                 | 62.7                | 2.8                          | .577                             | .40                                              | .62                                                                     | .911                                                                |
| 3              | 63.2                            | 1.6                 | 62.2                | 2.7                          | .567                             | .30                                              | .58                                                                     | .915                                                                |
| 4              | 62.9                            | 1.5                 | 61.9                | 2.5                          | .562                             | .25                                              | .53                                                                     | .922                                                                |
| 5              | 62.5                            | 1.5                 | 61.5                | 2.5                          | .554                             | .16                                              | .52                                                                     | .922                                                                |
| 6              | 62.0                            | 1.5                 | 61.0                | 2.5                          | .546                             | .08                                              | .50                                                                     | .923                                                                |
| 7              | 61.9                            | 1.2                 | 61.1                | 2.1                          | .547                             | .10                                              | .42                                                                     | .934                                                                |
| 8              | 63.8                            | 1.8                 | 62.6                | 3.0                          | .576                             | .39                                              | .66                                                                     | .906                                                                |
| 9              | 66.0                            | 3.4                 | 64.1                | 5.2                          | .606                             | .67                                              | 1.23                                                                    | .846                                                                |
| 10             | 67.6                            | 4.7                 | 65.1                | 7.2                          | .625                             | .84                                              | 1.80                                                                    | .794                                                                |
| 11             | 68.4                            | 6.0                 | 65.4                | 9.0                          | .632                             | .89                                              | 2.33                                                                    | .750                                                                |
| Noon.          | 69.3                            | 7.2                 | 65.6                | 10.8                         | .637                             | .91                                              | 2.93                                                                    | .709                                                                |
| 1              | 70.4                            | 7.7                 | 66.6                | 11.5                         | .656                             | 7.10                                             | 3.23                                                                    | .695                                                                |
| 2              | 70.9                            | 7.8                 | 67.0                | 11.7                         | .665                             | 7.19                                             | 3.35                                                                    | .693                                                                |
| 3              | 71.3                            | 7.9                 | 67.4                | 11.9                         | .673                             | 7.26                                             | 3.46                                                                    | .688                                                                |
| 4              | 71.0                            | 8.1                 | 67.0                | 12.1                         | .664                             | 7.16                                             | 3.48                                                                    | .682                                                                |
| 5              | 70.6                            | 7.2                 | 67.0                | 10.9                         | .665                             | 7.20                                             | 3.07                                                                    | .709                                                                |
| 6              | 70.0                            | 5.2                 | 67.4                | 7.8                          | .673                             | 7.32                                             | 2.15                                                                    | .778                                                                |
| 7              | 68.9                            | 3.9                 | 66.8                | 6.0                          | .661                             | 7.22                                             | 1.57                                                                    | .824                                                                |
| 8              | 67.8                            | 3.2                 | 66.1                | 4.9                          | .645                             | 7.08                                             | 1.25                                                                    | .852                                                                |
| 9              | 66.9                            | 2.8                 | 65.3                | 4.3                          | .629                             | 6.93                                             | 1.05                                                                    | .868                                                                |
| 10             | 66.2                            | 2.5                 | 64.8                | 4.0                          | .618                             | 6.81                                             | 0.95                                                                    | .879                                                                |
| 11             | 65.3                            | 2.3                 | 63.9                | 3.7                          | .600                             | 6.63                                             | 0.86                                                                    | .886                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of February, 1854.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                                                                                           |
|-------|-----------------------|-------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------|
|       | °                     | Inc.  |                                   |                                                                                                                      |
| 1     | 123.9                 | ..    | S. or S. W.                       | Cloudless nearly the whole day.                                                                                      |
| 2     | 121.0                 | ..    | S. or N. or N. E.                 | Cloudy.                                                                                                              |
| 3     | 126.0                 | ..    | S. or N. W.                       | Cloudy till 2 P. M. cloudless afterwards.                                                                            |
| 4     | 125.0                 | ..    | N. W. or S. W.                    | Cloudless.                                                                                                           |
| 5     | <i>Sunday.</i>        |       |                                   |                                                                                                                      |
| 6     | 130.0                 | ..    | S or N. W. or N. E.               | Cloudy till 4 P. M. cloudless afterwards.                                                                            |
| 7     | 128.0                 | ..    | S. W. or N. or N. W.              | Cloudless.                                                                                                           |
| 8     | 128.2                 | ..    | N. W.                             | Ditto.                                                                                                               |
| 9     | 129.0                 | ..    | W. or S. W.                       | Ditto.                                                                                                               |
| 10    | 133.0                 | ..    | Calm or S. W.                     | Cloudless till 10 A. M. scattered $\searrow$ till 5 P. M. cloudless afterwards, also dense fog between 6 and 9 A. M. |
| 11    | 121.0                 | 0.16  | S. S. E.                          | Cloudy, also raining between 1 and 2 P. M.                                                                           |
| 12    | <i>Sunday.</i>        |       |                                   |                                                                                                                      |
| 13    | ....                  | ..    | S. or N.                          | Scattered $\searrow$ and $\swarrow$ till 7 A. M. cloudy afterwards.                                                  |
| 14    | ....                  | 0.41  | N. or N. W. or N. E.              | Cloudy and raining from noon to 3 P. M. also drizzling afterwards.                                                   |
| 15    | 134.0                 | 0.12  | W. or N. or S. W.                 | Cloudy till 5 P. M. also drizzling between midnight and 4 A. M. cloudless after 5 P. M.                              |
| 16    | 131.0                 | ..    |                                   | Cloudless.                                                                                                           |
| 17    | 134.0                 | ..    | S. W. or N. W.                    | Ditto.                                                                                                               |
| 18    | 136.8                 | ..    | N. W.                             | Ditto.                                                                                                               |
| 19    | <i>Sunday.</i>        |       |                                   |                                                                                                                      |
| 20    | 135.2                 | ..    | N. W.                             | Cloudless.                                                                                                           |
| 21    | 132.5                 | ..    | S. or W. S. W.                    | Ditto.                                                                                                               |
| 22    | 136.0                 | ..    | N. W. or S.                       | Cloudless till 6 A. M. scattered $\searrow$ and $\swarrow$ or $\swarrow$ till 3 P. M. cloudless afterwards.          |
| 23    | 134.0                 | ..    | N. W.                             | Cloudless till 3 A. M. scattered $\searrow$ till 7 P. M. cloudless afterwards.                                       |
| 24    | 125.0                 | ..    | S.                                | Cloudless till 5 A. M. cloudy afterwards.                                                                            |
| 25    | 136.3                 | ..    | Calm or N.                        | Cloudless.                                                                                                           |
| 26    | <i>Sunday.</i>        | 0.32  |                                   |                                                                                                                      |
| 27    | 134.8                 | ..    | N. W.                             | Nearly cloudless.                                                                                                    |
| 28    | 135.0                 | ..    | Calm or S. S. W. or W.            | Cloudless.                                                                                                           |

$\searrow$  Cirri,  $\swarrow$  cumuli, —i strati,  $\swarrow$  cirrocumuli,  $\searrow$  cirro strati,  $\swarrow$  cumulo strati,  $\swarrow$  Nimbi.

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of March, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.391     | 76.0         | 76.5    | 56.6      | ..                   | ..       | W.                     | Clear                |
| 2     | 29.455     | 73.0         | 74.5    | 64.9      | ..                   | ..       | N. W.                  | Ditto                |
| 3     | 29.419     | 72.0         | 72.8    | 62.1      | ..                   | ..       | S.                     | Ditto                |
| 4     | 29.373     | 77.4         | 78.6    | 61.0      | ..                   | ..       | S. E.                  | Ditto                |
| 5     | 29.389     | 73.0         | 73.6    | 61.0      | ..                   | ..       | E.                     | Ditto                |
| 6     | 29.547     | 71.8         | 72.3    | 54.4      | ..                   | ..       | N. W.                  | Hazy                 |
| 7     | 29.573     | 66.5         | 67.5    | 54.0      | ..                   | ..       | N. W.                  | Clear                |
| 8     | 29.491     | 66.0         | 68.0    | 52.0      | ..                   | ..       | N. W.                  | Hazy                 |
| 9     | 29.559     | 66.9         | 68.0    | 55.6      | ..                   | ..       | W.                     | Clear                |
| 10    | 29.599     | 68.0         | 69.2    | 52.8      | ..                   | ..       | W.                     | Ditto                |
| 11    | 29.571     | 73.0         | 74.3    | 57.2      | ..                   | ..       | N. W.                  | ~ scattered          |
| 12    | 29.507     | 76.8         | 77.2    | 60.0      | ..                   | ..       | W.                     | Clear                |
| 13    | 29.479     | 79.8         | 82.0    | 63.0      | ..                   | ..       | W.                     | Ditto                |
| 14    | 29.515     | 77.0         | 77.0    | 65.0      | ..                   | ..       | N.                     | Ditto                |
| 15    | 29.512     | 73.0         | 73.2    | 53.0      | ..                   | ..       | N. W.                  | Ditto                |
| 16    | 29.497     | 72.5         | 74.5    | 54.0      | ..                   | ..       | N. W.                  | Clear                |
| 17    | 29.539     | 72.9         | 75.4    | 65.5      | ..                   | ..       | E.                     | Ditto                |
| 18    | 29.539     | 72.5         | 73.8    | 55.0      | ..                   | ..       | N. W.                  | ~ very few scattered |
| 19    | 29.567     | 74.0         | 74.8    | 56.0      | ..                   | ..       | W.                     | ~ scattered          |
| 20    | 29.553     | 79.0         | 81.0    | 59.0      | ..                   | ..       | E.                     | ~ ditto              |
| 21    | 29.553     | 81.0         | 83.4    | 60.5      | ..                   | ..       | E.                     | Ditto                |
| 22    | 29.585     | 81.0         | 83.5    | 62.0      | ..                   | ..       | N.                     | Ditto                |
| 23    | 29.555     | 82.5         | 83.5    | 61.8      | ..                   | ..       | N.                     | Hazy                 |
| 24    | 29.563     | 82.9         | 84.4    | 65.0      | ..                   | ..       | S. E.                  | ~ scattered          |
| 25    | 29.595     | 78.3         | 78.3    | 62.0      | ..                   | ..       | N. W.                  | ~ all over           |
| 26    | 29.569     | 80.2         | 80.8    | 60.0      | ..                   | ..       | N.                     | Clear                |
| 27    | 29.529     | 83.4         | 84.9    | 62.8      | ..                   | ..       | N.                     | Ditto                |
| 28    | 29.479     | 81.0         | 82.0    | 64.7      | ..                   | ..       | N. W.                  | Ditto                |
| 29    | 29.433     | 84.0         | 86.0    | 63.3      | ..                   | ..       | N. W.                  | Ditto                |
| 30    | 29.409     | 83.9         | 86.5    | 63.5      | ..                   | ..       | N. W.                  | Ditto                |
| 31    | 29.415     | 88.6         | 88.8    | 64.5      | ..                   | ..       | W.                     | Ditto                |
| Mean. | 29.508     | 76.4         | 77.6    | 59.4      | ..                   | ..       | ..                     | .....                |

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6 at times it is far greater.

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of March, 1854.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.359     | 81.0         | 81.5    | 60.0      | ..                   | ..       | W.                     | Clear                |
| 2     | 29.425     | 78.0         | 79.0    | 64.9      | ..                   | ..       | N. W.                  | Ditto                |
| 3     | 29.367     | 78.7         | 79.9    | 59.7      | ..                   | ..       | S. W.                  | Ditto                |
| 4     | 29.345     | 82.0         | 83.5    | 64.6      | ..                   | ..       | S. E.                  | Ditto                |
| 5     | 29.357     | 76.8         | 77.1    | 64.0      | ..                   | ..       | E.                     | ✓ a few scattered    |
| 6     | 29.529     | 75.0         | 75.3    | 55.5      | ..                   | ..       | N. W.                  | Hazy                 |
| 7     | 29.547     | 70.3         | 71.2    | 51.0      | ..                   | ..       | N. W.                  | Clear                |
| 8     | 29.471     | 74.0         | 74.3    | 54.5      | ..                   | ..       | N. W.                  | Hazy                 |
| 9     | 29.535     | 72.0         | 73.0    | 54.5      | ..                   | ..       | W.                     | Clear                |
| 10    | 29.563     | 72.9         | 74.1    | 52.8      | ..                   | ..       | W.                     | Ditto                |
| 11    | 29.539     | 78.7         | 80.5    | 58.0      | ..                   | ..       | N. W.                  | ✓ scattered          |
| 12    | 29.491     | 85.0         | 87.0    | 63.5      | ..                   | ..       | W.                     | Clear                |
| 13    | 29.459     | 86.7         | 87.3    | 64.5      | ..                   | ..       | W.                     | Ditto                |
| 14    | 29.481     | 81.5         | 82.0    | 64.6      | ..                   | ..       | N. W.                  | ✓ scattered          |
| 15    | 29.475     | 76.8         | 78.0    | 54.0      | ..                   | ..       | N. W.                  | Clear                |
| 16    | 29.485     | 76.7         | 77.4    | 54.8      | ..                   | ..       | N. W.                  | Ditto                |
| 17    | 29.535     | 77.8         | 78.2    | 56.6      | ..                   | ..       | W.                     | Ditto                |
| 18    | 29.525     | 77.9         | 78.5    | 56.4      | ..                   | ..       | W.                     | ✓ very few scattered |
| 19    | 29.533     | 77.6         | 78.5    | 56.9      | ..                   | ..       | N. W.                  | ✓ scattered          |
| 20    | 29.531     | 82.3         | 83.8    | 59.7      | ..                   | ..       | E.                     | ✓ scattered all over |
| 21    | 29.525     | 85.5         | 87.0    | 61.6      | ..                   | ..       | E.                     | ✓ scattered          |
| 22    | 29.565     | 85.5         | 88.4    | 63.3      | ..                   | ..       | N.                     | Ditto                |
| 23    | 29.551     | 87.2         | 90.0    | 63.0      | ..                   | ..       | N. W.                  | ✓ scat. towards S.   |
| 24    | 29.539     | 87.5         | 88.5    | 65.5      | ..                   | ..       | S. E.                  | ✓ scattered          |
| 25    | 29.575     | 82.7         | 84.7    | 63.4      | ..                   | ..       | N.                     | ✓ scattered          |
| 26    | 29.519     | 84.5         | 85.2    | 62.0      | ..                   | ..       | N.                     | Clear                |
| 27    | 29.497     | 87.5         | 88.2    | 65.3      | ..                   | ..       | N.                     | Ditto                |
| 28    | 29.449     | 84.8         | 85.7    | 63.5      | ..                   | ..       | N. W.                  | Ditto                |
| 29    | 29.417     | 86.7         | 87.9    | 54.0      | ..                   | ..       | N. W.                  | Ditto                |
| 30    | 29.385     | 88.0         | 89.2    | 64.1      | ..                   | ..       | N. W.                  | Ditto                |
| 31    | 29.381     | 92.5         | 94.3    | 65.5      | ..                   | ..       | W.                     | Ditto                |
| Mean. | 29.182     | 81.1         | 82.2    | 66.2      | ..                   | ..       | ..                     | .....                |

Barometer observations corrected for capillarity only.

Symbols. {  
 \ Cirris.  
 \ Cirro strata.  
 > Cumuli.  
 > Cumulo strata.  
 \ Nimbi or Nimbus.



*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of March, 1854.*

Minimum pressure observed at 4 p. m.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Rain Gauges.                 |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.317     | 84.8         | 84.5    | 64.0      | 85.0                 | 64.0     | 74.5  | Clear              | ..                           | W.                     |
| 2     | 29.375     | 82.5         | 82.0    | 61.0      | 81.5                 | 63.5     | 72.5  | Ditto              | ..                           | N.W.                   |
| 3     | 29.313     | 82.0         | 83.0    | 62.2      | 82.3                 | 63.0     | 72.65 | Ditto              | ..                           | S.W.                   |
| 4     | 29.267     | 89.0         | 88.5    | 71.6      | 88.5                 | 63.9     | 76.2  | Ditto              | ..                           | S. E.                  |
| 5     | 29.311     | 79.5         | 80.2    | 70.6      | 81.0                 | 62.0     | 71.5  | ~ a few scatd.     | ..                           | E.                     |
| 6     | 29.483     | 78.9         | 77.5    | 56.0      | 78.0                 | 61.9     | 69.95 | Hazy               | ..                           | N.W.                   |
| 7     | 29.477     | 76.6         | 76.2    | 55.0      | 75.5                 | 50.5     | 63.0  | Clear              | ..                           | N.W.                   |
| 8     | 29.411     | 74.8         | 73.0    | 57.8      | 74.7                 | 54.0     | 64.35 | ~ all over         | ..                           | N.                     |
| 9     | 29.505     | 77.0         | 76.8    | 55.5      | 76.0                 | 55.0     | 65.5  | Clear              | ..                           | W.                     |
| 10    | 29.497     | 79.8         | 80.8    | 61.4      | 79.5                 | 55.0     | 67.25 | ~ scatd. in s.     | ..                           | W.                     |
| 11    | 29.475     | 86.5         | 87.4    | 63.5      | 86.2                 | 61.0     | 73.6  | Scattered          | ..                           | N.W.                   |
| 12    | 29.453     | 90.0         | 90.6    | 67.2      | 91.5                 | 69.0     | 80.25 | Clear              | ..                           | W.                     |
| 13    | 29.395     | 91.0         | 91.0    | 69.5      | 90.5                 | 68.0     | 79.25 | Hazy               | ..                           | W.                     |
| 14    | 29.433     | 86.5         | 86.0    | 63.9      | 88.5                 | 66.5     | 77.5  | Scattered          | ..                           | N.W.                   |
| 15    | 29.381     | 83.3         | 83.0    | 56.5      | 83.0                 | 61.5     | 72.25 | Clear              | ..                           | N.W.                   |
| 16    | 29.409     | 82.5         | 82.5    | 57.4      | 82.0                 | 58.8     | 70.4  | ~ scattered        | ..                           | N.W.                   |
| 17    | 29.489     | 84.8         | 84.8    | 57.8      | 84.0                 | 58.5     | 71.25 | Clear [scatd.      | ..                           | N.W.                   |
| 18    | 29.453     | 85.0         | 85.2    | 58.2      | 84.5                 | 60.5     | 72.5  | ~ very few         | ..                           | W.                     |
| 19    | 29.469     | 88.5         | 89.2    | 59.0      | 89.5                 | 60.5     | 75.0  | ~ scatd. [o'er     | ..                           | N.W.                   |
| 20    | 29.449     | 86.5         | 87.2    | 65.5      | 86.5                 | 61.0     | 73.75 | ~ scatd. all       | ..                           | E.                     |
| 21    | 29.451     | 89.5         | 90.5    | 64.0      | 90.0                 | 67.0     | 78.5  | ~ scattered        | ..                           | S. E.                  |
| 22    | 29.485     | 91.0         | 91.5    | 66.8      | 91.0                 | 66.0     | 78.5  | Ditto              | ..                           | S.                     |
| 23    | 29.517     | 93.0         | 93.4    | 67.0      | 92.5                 | 71.0     | 81.75 | Ditto              | ..                           | N.W.                   |
| 24    | 29.505     | 88.0         | 86.8    | 66.9      | 86.0                 | 71.5     | 78.75 | ~ all over         | ..                           | N.W.                   |
| 25    | 29.505     | 88.5         | 88.4    | 66.7      | 87.5                 | 71.5     | 79.5  | Clear              | ..                           | N.W.                   |
| 26    | 29.465     | 90.6         | 91.2    | 64.0      | 91.2                 | 66.0     | 78.6  | Ditto              | ..                           | N.                     |
| 27    | 29.421     | 94.2         | 94.0    | 65.8      | 93.5                 | 67.0     | 80.25 | Clear              | ..                           | N.W.                   |
| 28    | 29.385     | 90.4         | 90.5    | 63.5      | 90.0                 | 68.0     | 79.0  | Ditto              | ..                           | N.W.                   |
| 29    | 29.335     | 92.9         | 93.5    | 65.3      | 92.5                 | 69.0     | 80.75 | Ditto              | ..                           | N.W.                   |
| 30    | 29.337     | 94.0         | 95.5    | 66.0      | 94.4                 | 70.0     | 82.2  | Ditto              | ..                           | N.W.                   |
| 31    | 29.311     | 98.2         | 99.9    | 77.4      | 98.4                 | 75.5     | 86.95 | Ditto              | ..                           | W.                     |
| Mn.   | 29.422     | 86.4         | 86.6    | 63.5      | 85.6                 | 64.6     | 75.1  | ....               | ..                           | ..                     |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of April, 1854.*

| Maximum pressure observed at 9.50 A. M. |            |              |         |           |                      |          |                        |                    |
|-----------------------------------------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------|
| Date.                                   | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky. |
|                                         |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                    |
| 1                                       | 29.439     | 87.9         | 89.5    | 65.0      | ..                   | ..       | E.                     | Clear              |
| 2                                       | 29.427     | 89.5         | 90.2    | 66.0      | ..                   | ..       | E.                     | Ditto              |
| 3                                       | 29.383     | 92.0         | 93.2    | 66.3      | ..                   | ..       | W.                     | Ditto              |
| 4                                       | 29.329     | 90.5         | 92.0    | 65.0      | ..                   | ..       | S. W.                  | ✓ scattered        |
| 5                                       | 29.367     | 92.2         | 93.0    | 68.5      | ..                   | ..       | W.                     | Clear              |
| 6                                       | 29.277     | 94.0         | 94.8    | 66.0      | ..                   | ..       | N. W.                  | ✓ scattered        |
| 7                                       | 29.279     | 92.0         | 91.8    | 72.3      | ..                   | ..       | N.                     | Clear              |
| 8                                       | 29.277     | 91.0         | 91.6    | 65.9      | ..                   | ..       | W.                     | Ditto              |
| 9                                       | 29.289     | 89.0         | 89.6    | 62.8      | ..                   | ..       | N.                     | ✓ scattered        |
| 10                                      | 29.309     | 86.0         | 87.0    | 61.0      | ..                   | ..       | N. W.                  | Clear              |
| 11                                      | 29.333     | 86.0         | 87.4    | 61.5      | ..                   | ..       | N. W.                  | Ditto              |
| 12                                      | 29.401     | 84.0         | 83.5    | 65.5      | ..                   | ..       | N. E.                  | ✓ all over         |
| 13                                      | 29.305     | 89.0         | 89.8    | 64.5      | ..                   | ..       | N. W.                  | Clear              |
| 14                                      | 29.299     | 90.1         | 91.0    | 65.0      | ..                   | ..       | N. W.                  | ✓ scattered        |
| 15                                      | 29.269     | 87.8         | 89.2    | 62.3      | ..                   | ..       | N. W.                  | Clear              |
| 16                                      | 29.309     | 86.0         | 86.8    | 60.6      | ..                   | ..       | N. W.                  | ~ a few to N.      |
| 17                                      | 29.357     | 85.0         | 86.4    | 59.0      | ..                   | ..       | N. W.                  | Clear              |
| 18                                      | 29.389     | 87.8         | 89.0    | 62.0      | ..                   | ..       | N. W.                  | Ditto              |
| 19                                      | 29.383     | 87.5         | 88.0    | 60.3      | ..                   | ..       | N.                     | ✓ all over         |
| 20                                      | 29.329     | 88.9         | 90.0    | 65.4      | ..                   | ..       | E.                     | Clear              |
| 21                                      | 29.295     | 93.5         | 94.4    | 67.0      | ..                   | ..       | N. W.                  | Ditto              |
| 22                                      | 29.311     | 92.0         | 93.4    | 63.7      | ..                   | ..       | N.                     | Ditto              |
| 23                                      | 29.305     | 92.0         | 92.8    | 64.0      | ..                   | ..       | N. W.                  | Ditto              |
| 24                                      | 29.283     | 91.3         | 92.2    | 63.9      | ..                   | ..       | N. W.                  | Ditto              |
| 25                                      | 29.355     | 94.5         | 95.8    | 71.4      | ..                   | ..       | N. E.                  | Ditto              |
| 26                                      | 29.339     | 97.0         | 98.0    | 67.5      | ..                   | ..       | N. W.                  | Ditto              |
| 27                                      | 29.397     | 97.0         | 98.0    | 65.0      | ..                   | ..       | N. W.                  | Ditto              |
| 28                                      | 29.299     | 94.0         | 95.9    | 63.3      | ..                   | ..       | N. W.                  | Ditto              |
| 29                                      | 29.253     | 93.0         | 93.9    | 64.0      | ..                   | ..       | N. W.                  | Ditto              |
| 30                                      | 29.425     | 94.0         | 94.6    | 63.0      | ..                   | ..       | N.                     | Ditto              |
| Mean.                                   | 29.333     | 90.4         | 91.4    | 64.5      | ..                   | ..       | ..                     | ..                 |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of April, 1854.*

## Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.    |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|-----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                       |
| 1     | 29.405     | 91.5         | 94.4    | 66.4      | ..                   | ..       | E.                     | Clear                 |
| 2     | 29.391     | 92.6         | 93.2    | 67.0      | ..                   | ..       | N. E.                  | Ditto                 |
| 3     | 29.351     | 96.7         | 98.8    | 67.0      | ..                   | ..       | W.                     | Ditto                 |
| 4     | 29.291     | 99.5         | 101.3   | 66.5      | ..                   | ..       | W.                     | Ditto                 |
| 5     | 29.349     | 97.4         | 98.7    | 69.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 6     | 29.283     | 99.0         | 99.8    | 67.7      | ..                   | ..       | N. W.                  | ~ very few scattered  |
| 7     | 29.253     | 95.4         | 94.9    | 73.0      | ..                   | ..       | N.                     | ~ scattered in zenith |
| 8     | 29.237     | 94.6         | 94.4    | 68.9      | ..                   | ..       | W.                     | Clear                 |
| 9     | 29.257     | 93.4         | 94.2    | 64.0      | ..                   | ..       | N. W.                  | scattered             |
| 10    | 29.295     | 91.0         | 91.6    | 63.4      | ..                   | ..       | N. W.                  | Clear                 |
| 11    | 29.301     | 90.6         | 91.5    | 62.8      | ..                   | ..       | N. W.                  | ~ towards W.          |
| 12    | 29.271     | 89.8         | 91.4    | 67.3      | ..                   | ..       | S. E.                  | ~ towards N.          |
|       |            |              |         |           |                      |          |                        | ~ towards E.          |
| 13    | 29.285     | 92.0         | 92.7    | 67.0      | ..                   | ..       | N. W.                  | ~ scattered           |
| 14    | 29.271     | 93.0         | 94.2    | 67.5      | ..                   | ..       | N. W.                  | Ditto                 |
| 15    | 29.239     | 92.5         | 94.1    | 67.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 16    | 29.275     | 90.5         | 91.1    | 66.0      | ..                   | ..       | N. W.                  | ~ a few to N.         |
| 17    | 29.341     | 90.0         | 90.7    | 61.5      | ..                   | ..       | N.                     | Clear                 |
| 18    | 29.363     | 92.5         | 92.7    | 62.4      | ..                   | ..       | N. W.                  | Ditto                 |
| 19    | 29.331     | 90.1         | 92.7    | 64.3      | ..                   | ..       | N. E.                  | ~ all over            |
| 20    | 29.307     | 94.0         | 95.6    | 71.6      | ..                   | ..       | E.                     | Clear                 |
| 21    | 29.273     | 98.4         | 99.8    | 64.5      | ..                   | ..       | N. W.                  | Ditto                 |
| 22    | 29.281     | 98.2         | 96.6    | 64.0      | ..                   | ..       | N.                     | Ditto                 |
| 23    | 29.283     | 98.5         | 99.2    | 65.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 24    | 29.271     | 96.0         | 97.8    | 63.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 25    | 29.345     | 98.9         | 100.4   | 71.5      | ..                   | ..       | N. E.                  | Ditto                 |
| 26    | 29.321     | 101.7        | 102.7   | 70.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 27    | 29.381     | 99.0         | 100.2   | 67.6      | ..                   | ..       | N. W.                  | Ditto                 |
| 28    | 29.263     | 98.9         | 98.5    | 70.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 29    | 29.237     | 96.8         | 97.5    | 70.0      | ..                   | ..       | S.                     | Ditto                 |
| 30    | 29.371     | 97.6         | 98.0    | 64.8      | ..                   | ..       | N.                     | Ditto                 |
| Mean. | 29.302     | 95.0         | 96.0    | 66.6      | ..                   | ..       | ..                     | ..                    |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of April, 1854.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.    | Rain Gauges.                 |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|-----------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                       | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.339     | 98.9         | 99.5    | 73.0      | 98.8                 | 74.0     | 86.4  | Clear                 | ..                           | N.                     |
| 2     | 29.325     | 99.5         | 100.6   | 70.0      | 100.0                | 75.0     | 87.5  | Ditto                 | ..                           | N. E.                  |
| 3     | 29.271     | 103.0        | 102.8   | 67.5      | 102.0                | 74.0     | 88.0  | Ditto                 | ..                           | N.W.                   |
| 4     | 29.251     | 100.5        | 99.5    | 69.5      | 101.0                | 79.0     | 90.0  | Hazy                  | ..                           | N.                     |
| 5     | 29.261     | 101.5        | 101.5   | 71.4      | 101.0                | 83.5     | 92.25 | Ditto                 | ..                           | N.W.                   |
| 6     | 29.171     | 101.0        | 100.5   | 69.8      | 102.0                | 83.5     | 92.75 | ~ all over            | ..                           | N.W.                   |
| 7     | 29.197     | 99.0         | 98.6    | 76.5      | 98.0                 | 83.0     | 90.85 | ~ scattered in zenith | ..                           | N.W.                   |
| 8     | 29.135     | 99.5         | 98.0    | 69.5      | 98.0                 | 81.9     | 89.95 | ~ in zenith           | ..                           | N.W.                   |
| 9     | 29.203     | 96.8         | 97.2    | 64.8      | 98.0                 | 78.0     | 88.0  | ~ scattered           | ..                           | W.                     |
| 10    | 29.243     | 93.1         | 91.5    | 63.5      | 93.0                 | 75.8     | 84.4  | Hazy [W.              | ..                           | N.                     |
| 11    | 29.244     | 96.4         | 95.8    | 65.3      | 97.0                 | 72.5     | 84.75 | ~ towards             | ..                           | N.W.                   |
| 12    | 29.211     | 96.5         | 97.0    | 69.2      | 96.0                 | 80.5     | 88.25 | ~ all over            | ..                           | N.                     |
| 13    | 29.215     | 93.4         | 93.5    | 66.9      | 96.0                 | 76.5     | 86.25 | ~ to E. and N.        | ..                           | N.W.                   |
| 14    | 29.225     | 97.2         | 97.0    | 69.0      | 96.3                 | 81.0     | 88.65 | ~ scattered           | ..                           | N.W.                   |
| 15    | 29.181     | 95.2         | 94.5    | 65.0      | 95.0                 | 74.5     | 84.75 | ~ ditto               | ..                           | N.W.                   |
| 16    | 29.207     | 94.0         | 94.5    | 67.0      | 95.0                 | 72.6     | 83.8  | ~ a few to N.         | ..                           | N.                     |
| 17    | 29.289     | 94.0         | 94.6    | 62.0      | 93.5                 | 71.0     | 82.25 | Clear                 | ..                           | W.                     |
| 18    | 29.305     | 98.5         | 98.5    | 65.9      | 98.0                 | 72.0     | 85.0  | Ditto                 | ..                           | N.W.                   |
| 19    | 29.241     | 97.0         | 97.5    | 69.0      | 97.0                 | 78.0     | 87.5  | ~ to E. and W.        | ..                           | N. E.                  |
| 20    | 29.225     | 99.8         | 98.5    | 71.7      | 98.0                 | 76.5     | 87.25 | Clear                 | ..                           | E.                     |
| 21    | 29.183     | 101.1        | 101.3   | 68.0      | 100.5                | 80.5     | 90.5  | Ditto                 | ..                           | N.W.                   |
| 22    | 29.181     | 101.7        | 101.6   | 66.0      | 100.0                | 77.0     | 88.5  | Ditto                 | ..                           | N.W.                   |
| 23    | 29.171     | 102.2        | 102.9   | 67.0      | 102.0                | 78.0     | 90.0  | Ditto                 | ..                           | N.W.                   |
| 24    | 29.211     | 102.9        | 103.5   | 67.0      | 102.5                | 79.0     | 90.75 | Ditto                 | ..                           | N.W.                   |
| 25    | 29.273     | 102.0        | 102.5   | 72.0      | 102.0                | 85.5     | 93.75 | Ditto                 | ..                           | N.E.                   |
| 26    | 29.243     | 105.6        | 106.0   | 71.9      | 107.8                | 83.5     | 95.65 | Ditto                 | ..                           | N.W.                   |
| 27    | 29.309     | 103.0        | 102.7   | 66.2      | 103.7                | 81.5     | 92.6  | Ditto                 | ..                           | N.W.                   |
| 28    | 29.163     | 103.1        | 102.5   | 65.5      | 101.5                | 78.5     | 90.0  | Ditto                 | ..                           | N.W.                   |
| 29    | 29.197     | 100.5        | 99.7    | 66.0      | 99.0                 | 78.5     | 88.75 | Ditto                 | ..                           | N.W.                   |
| 30    | 29.219     | 101.7        | 102.0   | 67.5      | 101.5                | 79.0     | 90.25 | Ditto                 | ..                           | N.W.                   |
| Mn.   | 29.229     | 99.2         | 99.1    | 68.1      | 99.1                 | 78.1     | 88.63 | ..                    | ..                           | ..                     |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of March, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fah. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempe-<br>rature during<br>the day. |      |       |
|-------|------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|--------------------------------------------------|------|-------|
|       |                                                | Max.                                      | Min.    | Diff.   |                               | Max.                                             | Min. | Diff. |
|       | Inches.                                        | Inches.                                   | Inches. | Inches. | o                             | o                                                | o    | o     |
| 1     | 29.846                                         | 29.928                                    | 29.775  | 0.153   | 76.8                          | 88.2                                             | 66.0 | 22.2  |
| 2     | .780                                           | .867                                      | .683    | .184    | 78.8                          | 87.6                                             | 72.8 | 14.8  |
| 3     | .814                                           | .904                                      | .752    | .152    | 78.9                          | 89.2                                             | 69.9 | 19.3  |
| 4     | .838                                           | .913                                      | .785    | .128    | 79.7                          | 90.5                                             | 73.9 | 16.6  |
| 5     | <i>Sunday.</i>                                 |                                           |         |         |                               |                                                  |      |       |
| 6     | .826                                           | .894                                      | .765    | .129    | 82.1                          | 94.8                                             | 72.9 | 21.9  |
| 7     | .813                                           | .890                                      | .759    | .131    | 82.2                          | 92.9                                             | 72.9 | 20.0  |
| 8     | .868                                           | .969                                      | .787    | .182    | 77.2                          | 85.9                                             | 70.4 | 15.5  |
| 9     | .889                                           | .969                                      | .824    | .145    | 76.9                          | 87.4                                             | 67.2 | 20.2  |
| 10    | .927                                           | 30.017                                    | .868    | .149    | 74.4                          | 83.6                                             | 66.7 | 16.9  |
| 11    | .947                                           | .035                                      | .876    | .159    | 73.8                          | 84.8                                             | 63.4 | 21.4  |
| 12    | <i>Sunday</i>                                  |                                           |         |         |                               |                                                  |      |       |
| 13    | .814                                           | 29.884                                    | .735    | .149    | 80.1                          | 93.6                                             | 71.0 | 22.6  |
| 14    | .799                                           | .892                                      | .712    | .180    | 82.1                          | 95.6                                             | 70.7 | 24.9  |
| 15    | .817                                           | .898                                      | .753    | .145    | 81.6                          | 92.6                                             | 72.4 | 20.2  |
| 16    | .850                                           | .927                                      | .787    | .140    | 81.5                          | 92.5                                             | 70.6 | 21.9  |
| 17    | .882                                           | .955                                      | .826    | .129    | 81.1                          | 90.1                                             | 75.4 | 14.7  |
| 18    | .898                                           | .974                                      | .824    | .150    | 80.1                          | 88.4                                             | 72.8 | 15.6  |
| 19    | <i>Sunday.</i>                                 |                                           |         |         |                               |                                                  |      |       |
| 20    | .925                                           | .989                                      | .862    | .127    | 80.4                          | 89.2                                             | 74.0 | 15.2  |
| 21    | .928                                           | 30.012                                    | .869    | .143    | 82.3                          | 93.0                                             | 74.0 | 19.0  |
| 22    | .967                                           | .046                                      | .889    | .157    | 83.3                          | 95.0                                             | 74.4 | 20.6  |
| 23    | .935                                           | .017                                      | .850    | .167    | 82.0                          | 94.6                                             | 73.8 | 20.8  |
| 24    | .891                                           | 29.977                                    | .816    | .161    | 83.8                          | 96.6                                             | 75.6 | 21.0  |
| 25    | .886                                           | .978                                      | .810    | .168    | 83.3                          | 94.2                                             | 76.2 | 18.0  |
| 26    | <i>Sunday.</i>                                 |                                           |         |         |                               |                                                  |      |       |
| 27    | .889                                           | .969                                      | .799    | .170    | 85.5                          | 95.4                                             | 78.8 | 16.6  |
| 28    | .849                                           | .923                                      | .758    | .165    | 84.0                          | 91.8                                             | 77.4 | 17.4  |
| 29    | .802                                           | .892                                      | .661    | .231    | 80.5                          | 92.2                                             | 70.7 | 21.5  |
| 30    | .809                                           | .880                                      | .700    | .180    | 75.0                          | 87.6                                             | 69.0 | 18.6  |
| 31    | .855                                           | .928                                      | .796    | .132    | 76.0                          | 85.4                                             | 66.9 | 18.5  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of March, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 70.7                            | 6.1                 | 67.6                | 9.1                          | 0.677                            | 7.35                                             | 2.70                                                                    | 0.755                                                               |
| 2     | 75.9                            | 2.9                 | 74.5                | 4.4                          | .842                             | 9.11                                             | 1.46                                                                    | .875                                                                |
| 3     | 73.9                            | 5.0                 | 71.3                | 7.6                          | .760                             | 8.22                                             | 2.43                                                                    | .797                                                                |
| 4     | 76.8                            | 2.9                 | 75.3                | 4.4                          | .865                             | 9.33                                             | 1.54                                                                    | .873                                                                |
| 5     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 6     | 77.9                            | 4.2                 | 75.8                | 6.3                          | .879                             | 9.44                                             | 2.35                                                                    | .831                                                                |
| 7     | 75.5                            | 6.7                 | 72.2                | 10.1                         | .781                             | 8.38                                             | 3.39                                                                    | .735                                                                |
| 8     | 67.5                            | 9.7                 | 62.6                | 14.6                         | .573                             | 6.21                                             | 3.83                                                                    | .634                                                                |
| 9     | 70.0                            | 6.9                 | 66.5                | 10.4                         | .651                             | 7.07                                             | 2.99                                                                    | .729                                                                |
| 10    | 67.5                            | 7.0                 | 63.8                | 10.6                         | .595                             | 6.49                                             | 2.80                                                                    | .717                                                                |
| 11    | 65.6                            | 8.2                 | 61.3                | 12.5                         | .550                             | 5.99                                             | 3.19                                                                    | .675                                                                |
| 12    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 13    | 73.0                            | 7.1                 | 69.5                | 10.7                         | .715                             | 7.71                                             | 3.44                                                                    | .736                                                                |
| 14    | 74.0                            | 8.1                 | 69.9                | 12.1                         | .726                             | 7.81                                             | 4.02                                                                    | .707                                                                |
| 15    | 73.6                            | 8.0                 | 69.6                | 12.1                         | .719                             | 7.74                                             | 3.82                                                                    | .707                                                                |
| 16    | 75.1                            | 6.4                 | 71.8                | 9.7                          | .774                             | 8.32                                             | 3.22                                                                    | .754                                                                |
| 17    | 77.5                            | 3.6                 | 75.7                | 5.4                          | .876                             | 9.43                                             | 1.87                                                                    | .848                                                                |
| 18    | 76.6                            | 3.5                 | 74.8                | 5.3                          | .853                             | 9.19                                             | 1.79                                                                    | .850                                                                |
| 19    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 20    | 76.7                            | 3.7                 | 74.9                | 5.6                          | .851                             | 9.18                                             | 1.90                                                                    | .845                                                                |
| 21    | 76.7                            | 5.6                 | 73.9                | 8.4                          | .825                             | 8.86                                             | 2.91                                                                    | .779                                                                |
| 22    | 77.0                            | 6.3                 | 73.8                | 9.4                          | .823                             | 8.83                                             | 3.34                                                                    | .760                                                                |
| 23    | 76.7                            | 5.3                 | 74.1                | 8.0                          | .831                             | 8.93                                             | 2.78                                                                    | .789                                                                |
| 24    | 79.6                            | 4.2                 | 77.5                | 6.3                          | .926                             | 9.92                                             | 2.43                                                                    | .829                                                                |
| 25    | 79.3                            | 4.1                 | 77.2                | 6.2                          | .918                             | 9.84                                             | 2.29                                                                    | .832                                                                |
| 26    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 27    | 80.7                            | 4.7                 | 78.4                | 7.1                          | .951                             | 10.16                                            | 2.73                                                                    | .810                                                                |
| 28    | 79.3                            | 4.7                 | 76.9                | 7.1                          | .909                             | 9.74                                             | 2.60                                                                    | .811                                                                |
| 29    | 75.0                            | 5.5                 | 72.2                | 8.3                          | .787                             | 8.47                                             | 2.72                                                                    | .772                                                                |
| 30    | 71.2                            | 3.8                 | 69.3                | 5.7                          | .715                             | 7.78                                             | 1.72                                                                    | .839                                                                |
| 31    | 71.8                            | 4.2                 | 69.7                | 6.3                          | .722                             | 7.85                                             | 1.92                                                                    | .823                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of March, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fah. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                          | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                  | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 29.871                                   | 29.980                                                 | 29.772  | 0.208   | 75.3                       | 80.2                                                     | 69.1 | 11.1  |
| 1          | .861                                     | .976                                                   | .773    | .203    | 74.6                       | 79.9                                                     | 68.0 | 11.9  |
| 2          | .847                                     | .955                                                   | .761    | .194    | 74.0                       | 79.2                                                     | 67.7 | 11.5  |
| 3          | .836                                     | .954                                                   | .752    | .202    | 73.6                       | 79.2                                                     | 66.2 | 13.0  |
| 4          | .838                                     | .987                                                   | .754    | .233    | 73.0                       | 79.2                                                     | 65.0 | 14.2  |
| 5          | .843                                     | .983                                                   | .761    | .222    | 72.6                       | 79.2                                                     | 64.3 | 14.9  |
| 6          | .867                                     | .991                                                   | .794    | .197    | 72.3                       | 78.8                                                     | 63.6 | 15.2  |
| 7          | .893                                     | 30.028                                                 | .814    | .214    | 72.2                       | 79.2                                                     | 63.4 | 15.8  |
| 8          | .919                                     | .015                                                   | .834    | .181    | 75.2                       | 81.0                                                     | 67.5 | 13.5  |
| 9          | .937                                     | .033                                                   | .849    | .184    | 78.8                       | 84.4                                                     | 72.9 | 11.5  |
| 10         | .942                                     | .045                                                   | .847    | .198    | 82.0                       | 87.6                                                     | 75.9 | 11.7  |
| 11         | .932                                     | .036                                                   | .846    | .190    | 85.0                       | 90.9                                                     | 79.2 | 11.7  |
| Noon.      | .905                                     | .009                                                   | .803    | .206    | 87.4                       | 93.5                                                     | 81.3 | 12.2  |
| 1          | .872                                     | 29.981                                                 | .767    | .214    | 89.3                       | 94.1                                                     | 82.4 | 11.7  |
| 2          | .838                                     | .949                                                   | .727    | .222    | 90.3                       | 94.9                                                     | 82.8 | 12.1  |
| 3          | .817                                     | .925                                                   | .708    | .217    | 90.6                       | 95.8                                                     | 83.6 | 12.2  |
| 4          | .800                                     | .911                                                   | .683    | .228    | 90.2                       | 96.6                                                     | 83.6 | 13.0  |
| 5          | .795                                     | .889                                                   | .661    | .228    | 88.1                       | 94.0                                                     | 80.8 | 13.2  |
| 6          | .806                                     | .899                                                   | .685    | .214    | 84.7                       | 90.8                                                     | 68.5 | 22.3  |
| 7          | .827                                     | .919                                                   | .713    | .206    | 82.1                       | 87.2                                                     | 69.6 | 17.6  |
| 8          | .853                                     | .944                                                   | .735    | .209    | 80.3                       | 84.4                                                     | 69.0 | 15.4  |
| 9          | .880                                     | .971                                                   | .750    | .221    | 78.4                       | 82.6                                                     | 69.5 | 13.1  |
| 10         | .897                                     | 30.046                                                 | .781    | .265    | 77.1                       | 82.2                                                     | 69.0 | 13.2  |
| 11         | .885                                     | 29.976                                                 | .780    | .196    | 76.0                       | 81.2                                                     | 69.4 | 11.8  |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of March, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Wet Bulb Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew Point. | Mean Elastic force of Vapour. | Mean Weight of Vapour in a cubic foot of air. | Additional weight of Vapour required for complete saturation. | Mean degree of Humidity, complete saturation being unity. |
|------------|----------------------------|---------------------|---------------------|---------------------------|-------------------------------|-----------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|
|            | o                          | o                   | o                   | o                         | Inches.                       | T. gr.                                        | T. gr.                                                        |                                                           |
| Mid-night. | 72.5                       | 2.8                 | 71.0                | 4.2                       | 0.758                         | 8.25                                          | 1.17                                                          | 0.875                                                     |
| 1          | 72.2                       | 2.4                 | 70.9                | 3.7                       | .755                          | 8.23                                          | 1.01                                                          | .889                                                      |
| 2          | 71.8                       | 2.2                 | 70.6                | 3.4                       | .749                          | 8.17                                          | 0.91                                                          | .897                                                      |
| 3          | 71.4                       | 2.2                 | 70.3                | 3.3                       | .741                          | 8.09                                          | 0.86                                                          | .901                                                      |
| 4          | 71.0                       | 2.0                 | 69.9                | 3.1                       | .733                          | 8.02                                          | 0.80                                                          | .906                                                      |
| 5          | 70.7                       | 1.9                 | 69.6                | 3.0                       | .727                          | 7.95                                          | 0.77                                                          | .909                                                      |
| 6          | 70.3                       | 1.9                 | 69.3                | 3.0                       | .719                          | 7.87                                          | 0.75                                                          | .910                                                      |
| 7          | 70.4                       | 1.8                 | 69.5                | 2.7                       | .724                          | 7.92                                          | 0.69                                                          | .916                                                      |
| 8          | 72.3                       | 2.9                 | 70.8                | 4.4                       | .757                          | 8.24                                          | 1.17                                                          | .871                                                      |
| 9          | 74.2                       | 4.6                 | 71.9                | 6.9                       | .782                          | 8.45                                          | 2.01                                                          | .806                                                      |
| 10         | 75.6                       | 6.5                 | 72.3                | 9.7                       | .793                          | 8.52                                          | 3.01                                                          | .738                                                      |
| 11         | 77.1                       | 7.8                 | 73.2                | 11.8                      | .815                          | 8.67                                          | 3.87                                                          | .700                                                      |
| Noon.      | 78.0                       | 9.4                 | 73.3                | 14.1                      | .818                          | 8.69                                          | 4.81                                                          | .644                                                      |
| 1          | 78.4                       | 10.9                | 73.0                | 16.3                      | .810                          | 8.58                                          | 5.69                                                          | .602                                                      |
| 2          | 79.0                       | 11.4                | 73.3                | 17.0                      | .821                          | 8.67                                          | 6.04                                                          | .591                                                      |
| 3          | 79.0                       | 11.6                | 73.2                | 17.4                      | .817                          | 8.63                                          | 6.20                                                          | .584                                                      |
| 4          | 78.8                       | 11.4                | 73.1                | 17.2                      | .814                          | 8.60                                          | 6.07                                                          | .589                                                      |
| 5          | 78.1                       | 10.0                | 73.1                | 15.0                      | .814                          | 8.64                                          | 5.16                                                          | .629                                                      |
| 6          | 77.5                       | 7.2                 | 73.9                | 10.8                      | .834                          | 8.91                                          | 3.62                                                          | .714                                                      |
| 7          | 76.1                       | 5.9                 | 73.2                | 8.9                       | .812                          | 8.72                                          | 2.84                                                          | .757                                                      |
| 8          | 75.3                       | 4.9                 | 72.9                | 7.4                       | .804                          | 8.67                                          | 2.28                                                          | .792                                                      |
| 9          | 74.5                       | 4.0                 | 72.5                | 6.0                       | .795                          | 8.60                                          | 1.78                                                          | .832                                                      |
| 10         | 73.7                       | 3.4                 | 72.0                | 5.1                       | .782                          | 8.48                                          | 1.47                                                          | .852                                                      |
| 11         | 73.0                       | 3.0                 | 71.5                | 4.6                       | .769                          | 8.36                                          | 1.29                                                          | .865                                                      |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of March, 1854.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                                                                                                                                  |
|-------|-----------------------|-------|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | °                     | Inc.  |                                   |                                                                                                                                                             |
| 1     | 135.0                 | ..    | S. or N. W. or N. or S. W.        | Cloudless.                                                                                                                                                  |
| 2     | 136.4                 | ..    | S. W. or S.                       | Cloudless nearly the whole day.                                                                                                                             |
| 3     | 139.0                 | ..    | S. or S. W.                       | Cloudless.                                                                                                                                                  |
| 4     | 143.0                 | ..    | S.                                | Cloudless nearly the whole day.                                                                                                                             |
| 5     | Sunday.               | ..    |                                   | Sunday.                                                                                                                                                     |
| 6     | 141.0                 | ..    | S. or W. S. W.                    | Cloudless nearly the whole day.                                                                                                                             |
| 7     | 138.0                 | ..    | S. or W.                          | Cloudless nearly the whole day.                                                                                                                             |
| 8     | 137.2                 | ..    | S. or N. W. or W.                 | Cloudless the whole day.                                                                                                                                    |
| 9     | 135.0                 | ..    | S.                                | Cloudless till 4 A. M. scattered $\curvearrowright$ afterwards.                                                                                             |
| 10    | 128.0                 | 0.13  | N. or N. W.                       | Overcast with little rain till 3 A. M. nearly cloudless afterwards.                                                                                         |
| 11    | 132.0                 | ..    | N. or S. W.                       | Cloudless.                                                                                                                                                  |
| 12    | Sunday.               | ..    |                                   | Sunday.                                                                                                                                                     |
| 13    | 140.7                 | ..    | S. or S. W. or N. W.              | Cloudless.                                                                                                                                                  |
| 14    | 145.9                 | ..    | S. or S. W. or W.                 | Cloudless.                                                                                                                                                  |
| 15    | 141.5                 | ..    | S. or W. or N. W.                 | Cloudless.                                                                                                                                                  |
| 16    | 137.0                 | ..    | S. or W. or N. E.                 | Cloudless nearly the whole day.                                                                                                                             |
| 17    | 129.9                 | ..    | S.                                | Cloudy.                                                                                                                                                     |
| 18    | 129.7                 | ..    | S. E. or E. or S.                 | Cloudy.                                                                                                                                                     |
| 19    | Sunday                | ..    |                                   | Sunday.                                                                                                                                                     |
| 20    | 134.0                 | ..    | S. E. or S.                       | Cloudy with lightning at 9 P. M.                                                                                                                            |
| 21    | 134.0                 | ..    | S. or S. E. or W.                 | Cloudy till 6 P. M. cloudless afterwards.                                                                                                                   |
| 22    | 139.0                 | ..    | S. or S. W.                       | Cloudless till 3 A. M. scattered $\curvearrowright$ or $\curvearrowleft$ till 9 A. M. cloudless till 6 P. M. overcast afterwards with lightning at 10 P. M. |
| 23    | 136.9                 | 0.14  | S.                                | Cloudy with lightning at 8 P. M.                                                                                                                            |
| 24    | 143.0                 | ..    | S.                                | Cloudless nearly the whole day.                                                                                                                             |
| 25    | 144.0                 | ..    | S.                                | Cloudless till 5 P. M. cloudy afterwards and drizzling at 10 P. M.                                                                                          |
| 26    | Sunday.               | ..    |                                   | Sunday.                                                                                                                                                     |
| 27    | 144.0                 | ..    | S.                                | Cloudy till 7 A. M. cloudless till 3 P. M. scattered clouds afterwards.                                                                                     |
| 28    | 134.0                 | ..    | S.                                | Cloudless till 5 A. M. scattered $\curvearrowleft$ till 2 P. M. cloudy afterwards, lightning at 6 P. M. and drizzling at 10 P. M.                           |
| 29    | 133.0                 | ..    | S. or S. W.                       | Cloudy with little drizzling till 5 A. M. cloudless till 9 A. M. scattered $\curvearrowleft$ till 4 P. M. cloudy with drizzling and lightning afterwards.   |
| 30    | 134.5                 | 0.22  | N. E. or S.                       | Cloudy.                                                                                                                                                     |
| 31    | 140.0                 | 0.79  | N. E. or E. or S. E.              | Cloudy.                                                                                                                                                     |

$\curvearrowleft$  Cirri,  $\curvearrowright$  cumuli,  $\text{—}$  i strati,  $\curvearrowleft$  i cirro-cumuli,  $\curvearrowleft$  i cirro-strati,  $\curvearrowright$  i cumulo-strati,  $\curvearrowleft$  i nimbi.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of May, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.    |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|-----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                       |
| 1     | 29.319     | 97.0         | 97.7    | 67.0      | ..                   | ..       | S. E.                  | Clear                 |
| 2     | 29.367     | 97.5         | 98.0    | 68.0      | ..                   | ..       | S. W.                  | Ditto                 |
| 3     | 29.409     | 97.0         | 98.2    | 70.0      | ..                   | ..       | E.                     | Ditto                 |
| 4     | 29.363     | 95.0         | 96.3    | 72.2      | ..                   | ..       | W.                     | Ditto                 |
| 5     | 29.347     | 90.1         | 91.2    | 72.9      | ..                   | ..       | E.                     | Ditto                 |
| 6     | 29.335     | 91.5         | 91.8    | 73.0      | ..                   | ..       | E.                     | ~ scattered in zenith |
| 7     | 29.353     | 91.5         | 91.9    | 74.0      | ..                   | ..       | N.                     | Clear                 |
| 8     | 29.401     | 89.8         | 90.4    | 75.0      | ..                   | ..       | E.                     | ~ scattered           |
| 9     | 29.411     | 85.5         | 86.1    | 70.2      | ..                   | ..       | N. W.                  | ~ scattered           |
| 10    | 29.417     | 85.2         | 85.9    | 67.0      | ..                   | ..       | N. W.                  | Clear                 |
| 11    | 29.447     | 89.5         | 90.5    | 68.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 12    | 29.439     | 93.0         | 94.5    | 70.1      | ..                   | ..       | N. W.                  | Ditto                 |
| 13    | 29.417     | 95.0         | 94.6    | 71.0      | ..                   | ..       | N. W.                  | ~ all over            |
| 14    | 29.407     | 96.0         | 95.2    | 70.6      | ..                   | ..       | N.                     | ~ scattered           |
| 15    | 29.389     | 97.5         | 98.0    | 72.3      | ..                   | ..       | N.                     | Hazy                  |
| 16    | 29.415     | 92.0         | 93.5    | 72.1      | ..                   | ..       | N.                     | ~ scatd. towards S.   |
| 17    | 29.447     | 92.3         | 92.3    | 71.4      | ..                   | ..       | N. W.                  | Hazy                  |
| 18    | 29.477     | 90.5         | 92.0    | 71.0      | ..                   | ..       | N. E.                  | Clear                 |
| 19    | 29.399     | 96.0         | 97.0    | 70.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 20    | 29.385     | 95.0         | 96.3    | 67.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 21    | 29.385     | 96.5         | 97.3    | 69.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 22    | 29.287     | 101.5        | 102.9   | 74.5      | ..                   | ..       | N. W.                  | Ditto                 |
| 23    | 29.220     | 101.2        | 102.7   | 71.7      | ..                   | ..       | N. W.                  | Ditto                 |
| 24    | 29.193     | 102.0        | 102.6   | 70.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 25    | 29.155     | 104.0        | 104.5   | 70.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 26    | 29.091     | 106.1        | 106.4   | 72.2      | ..                   | ..       | N. W.                  | Ditto                 |
| 27    | 29.063     | 104.5        | 104.9   | 72.2      | ..                   | ..       | N. W.                  | Ditto                 |
| 28    | 29.061     | 104.2        | 104.8   | 70.6      | ..                   | ..       | W.                     | Ditto                 |
| 29    | 29.061     | 104.0        | 105.4   | 69.9      | ..                   | ..       | N. W.                  | Ditto                 |
| 30    | 29.103     | 100.5        | 100.5   | 74.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 31    | 29.167     | 104.2        | 104.3   | 72.9      | ..                   | ..       | N. W.                  | Ditto                 |
| Mean. | 29.313     | 96.3         | 97.0    | 70.9      | ..                   | ..       |                        | ..                    |

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6, at times it is far greater.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of May, 1854.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.             |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                                |
| 1     | 29.313     | 99.3         | 99.0    | 69.0      | ..                   | ..       | S.                     | Clear                          |
| 2     | 29.349     | 100.4        | 100.0   | 68.0      | ..                   | ..       | N.                     | Ditto                          |
| 3     | 29.389     | 100.0        | 99.7    | 72.5      | ..                   | ..       | E.                     | Ditto                          |
| 4     | 29.347     | 99.9         | 99.9    | 73.3      | ..                   | ..       | W.                     | Ditto                          |
| 5     | 29.339     | 95.0         | 95.0    | 75.0      | ..                   | ..       | W.                     | Hazy                           |
| 6     | 29.315     | 95.0         | 95.8    | 73.0      | ..                   | ..       | E.                     | ✓ scattered                    |
| 7     | 29.325     | 95.5         | 96.2    | 75.0      | ..                   | ..       | N.                     | Clear                          |
| 8     | 29.357     | 94.0         | 94.1    | 76.2      | ..                   | ..       | N. W.                  | Hazy                           |
| 9     | 29.331     | 90.0         | 90.6    | 71.4      | ..                   | ..       | N. W.                  | Clear                          |
| 10    | 29.405     | 91.0         | 92.3    | 69.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 11    | 29.425     | 96.5         | 96.7    | 70.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 12    | 29.423     | 97.0         | 98.3    | 71.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 13    | 29.381     | 97.0         | 97.4    | 70.5      | ..                   | ..       | N. W.                  | ✓ all over                     |
| 14    | 29.385     | 97.9         | 96.7    | 71.2      | ..                   | ..       | N. E.                  | ✓ scattered                    |
| 15    | 29.375     | 100.5        | 100.2   | 75.5      | ..                   | ..       | N. E.                  | Hazy                           |
| 16    | 29.389     | 97.3         | 98.9    | 71.0      | ..                   | ..       | N. W.                  | ✓ very few scattered in zenith |
| 17    | 29.403     | 94.0         | 93.5    | 74.4      | ..                   | ..       | N. W.                  | ✓ all over                     |
| 18    | 29.449     | 94.5         | 95.3    | 72.5      | ..                   | ..       | N. W.                  | Clear                          |
| 19    | 29.381     | 100.5        | 101.6   | 71.5      | ..                   | ..       | N. W.                  | Ditto                          |
| 20    | 29.375     | 97.9         | 98.3    | 67.2      | ..                   | ..       | N. W.                  | Ditto                          |
| 21    | 29.375     | 98.3         | 99.1    | 70.2      | ..                   | ..       | N. W.                  | Ditto                          |
| 22    | 29.263     | 106.7        | 107.5   | 73.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 23    | 29.205     | 106.5        | 107.2   | 72.8      | ..                   | ..       | N. W.                  | Ditto                          |
| 24    | 29.151     | 106.2        | 106.9   | 71.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 25    | 29.133     | 108.1        | 109.5   | 70.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 26    | 29.073     | 109.0        | 110.8   | 74.5      | ..                   | ..       | N. W.                  | Ditto                          |
| 27    | 29.053     | 109.6        | 111.0   | 72.5      | ..                   | ..       | N. W.                  | Ditto                          |
| 28    | 29.055     | 108.9        | 109.2   | 72.0      | ..                   | ..       | W.                     | Ditto                          |
| 29    | 29.057     | 109.5        | 109.5   | 74.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 30    | 29.099     | 105.5        | 106.8   | 75.0      | ..                   | ..       | N. W.                  | Ditto                          |
| 31    | 29.167     | 107.8        | 108.3   | 74.0      | ..                   | ..       | N. W.                  | Ditto                          |
| Mean. | 29.293     | 97.0         | 100.8   | 72.1      | ..                   | ..       | ..                     | ..                             |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of May, 1854.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |        | Aspect of the Sky.             | Rain Gauge.                  |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|--------|--------------------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean.  |                                | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.257     | 102.7        | 103.0   | 70.0      | 102.0                | 79.0     | 90.5   | Clear                          | ..                           | N.W.                   |
| 2     | 29.285     | 104.5        | 99.5    | 71.0      | 103.5                | 82.5     | 93.0   | Ditto                          | ..                           | N.W.                   |
| 3     | 29.297     | 102.8        | 102.5   | 73.0      | 102.0                | 84.0     | 93.0   | Ditto                          | ..                           | N.E.                   |
| 4     | 29.273     | 104.2        | 104.5   | 75.0      | 103.5                | 83.3     | 93.4   | Ditto                          | ..                           | N.W.                   |
| 5     | 29.273     | 98.0         | 98.3    | 76.2      | 97.5                 | 80.5     | 89.0   | ~ scattered in zenith          | ..                           | N.E.                   |
| 6     | 29.221     | 100.6        | 101.4   | 76.0      | 100.2                | 80.5     | 90.35  | Clear                          | ..                           | N.W.                   |
| 7     | 29.229     | 101.0        | 102.0   | 76.6      | 98.0                 | 78.0     | 88.0   | Ditto                          | ..                           | N.W.                   |
| 8     | 29.289     | 98.0         | 96.6    | 73.3      | 96.2                 | 79.2     | 87.7   | ~ scattered                    | ..                           | N.W.                   |
| 9     | 29.307     | 95.0         | 94.5    | 73.0      | 94.0                 | 83.5     | 88.75  | ~ all over                     | ..                           | N.W.                   |
| 10    | 29.345     | 96.1         | 95.9    | 69.6      | 95.0                 | 74.5     | 84.75  | Clear                          | ..                           | N.W.                   |
| 11    | 29.329     | 97.8         | 97.8    | 73.0      | 97.3                 | 77.5     | 87.4   | Ditto                          | ..                           | N.W.                   |
| 12    | 29.319     | 103.5        | 103.9   | 74.6      | 103.0                | 81.7     | 92.35  | Ditto                          | ..                           | N.W.                   |
| 13    | 29.269     | 100.5        | 100.0   | 75.5      | 99.8                 | 84.0     | 91.9   | ~ scattered all over           | ..                           | N.W.                   |
| 14    | 29.277     | 101.0        | 100.6   | 76.0      | 100.0                | 85.0     | 92.5   | ~ scattered                    | ..                           | N.E.                   |
| 15    | 29.307     | 100.3        | 99.5    | 73.7      | 99.0                 | 85.5     | 92.25  | Hazy                           | ..                           | N.                     |
| 16    | 29.293     | 102.7        | 103.0   | 72.5      | 102.2                | 78.7     | 90.45  | ~ very few scattered in zenith | ..                           | N.W.                   |
| 17    | 29.329     | 97.7         | 98.0    | 75.8      | 97.5                 | 84.5     | 91.0   | Clear                          | ..                           | W.                     |
| 18    | 29.381     | 103.0        | 101.5   | 74.5      | 101.0                | 79.0     | 90.0   | Ditto                          | ..                           | N.W.                   |
| 19    | 29.295     | 105.0        | 105.0   | 72.2      | 104.5                | 79.0     | 91.75  | Ditto                          | ..                           | N.W.                   |
| 20    | 29.281     | 105.0        | 104.5   | 72.0      | 104.0                | 84.5     | 94.25  | Ditto                          | ..                           | N.W.                   |
| 21    | 29.213     | 105.0        | 106.0   | 73.0      | 106.0                | 85.0     | 95.7   | Ditto                          | ..                           | N.W.                   |
| 22    | 29.161     | 110.0        | 109.9   | 74.1      | 109.5                | 87.0     | 98.25  | Ditto                          | ..                           | N.W.                   |
| 23    | 29.129     | 110.0        | 109.5   | 73.8      | 109.0                | 89.0     | 99.0   | Ditto                          | ..                           | N.W.                   |
| 24    | 29.107     | 110.5        | 110.0   | 73.0      | 109.0                | 92.4     | 100.7  | Ditto                          | ..                           | W.                     |
| 25    | 29.039     | 111.8        | 113.5   | 74.1      | 111.5                | 96.8     | 103.9  | Ditto                          | ..                           | N.W.                   |
| 26    | 28.997     | 114.5        | 114.0   | 73.5      | 114.0                | 91.5     | 102.5  | Ditto                          | ..                           | N.W.                   |
| 27    | 28.979     | 114.5        | 113.2   | 75.3      | 112.7                | 93.0     | 102.85 | Ditto                          | ..                           | N.                     |
| 28    | 28.997     | 113.8        | 113.5   | 73.2      | 113.0                | 91.2     | 101.1  | Ditto                          | ..                           | W.                     |
| 29    | 28.995     | 114.0        | 113.5   | 73.0      | 112.7                | 90.5     | 101.6  | Ditto                          | ..                           | N.W.                   |
| 30    | 29.023     | 112.5        | 112.5   | 75.0      | 111.5                | 90.0     | 100.75 | Ditto                          | ..                           | N.W.                   |
| 31    | 29.085     | 112.4        | 112.4   | 75.0      | 111.5                | 95.8     | 103.65 | Ditto                          | ..                           | N.W.                   |
| Mn.   | 29.210     | 104.7        | 104.5   | 73.7      | 103.8                | 84.7     | 94.31  | ..                             | ..                           | ..                     |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of April, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |                   |                  | Mean Dry Bulb<br>Thermometer. | Range of the Tempe-<br>rature during<br>the day. |           |           |
|-------|-------------------------------------------------|-------------------------------------------|-------------------|------------------|-------------------------------|--------------------------------------------------|-----------|-----------|
|       |                                                 | Max.                                      | Min.              | Diff.            |                               | Max.                                             | Min.      | Diff.     |
| 1     | Inches.<br>29.878                               | Inches.<br>29.961                         | Inches.<br>29.797 | Inches.<br>0.164 | o<br>79.5                     | o<br>90.2                                        | o<br>70.4 | o<br>19.8 |
| 2     | <i>Sunday.</i>                                  |                                           |                   |                  |                               |                                                  |           |           |
| 3     | .796                                            | .873                                      | .692              | .181             | 81.6                          | 90.1                                             | 71.6      | 18.5      |
| 4     | .761                                            | .822                                      | .687              | .135             | 78.9                          | 88.2                                             | 70.7      | 17.5      |
| 5     | .751                                            | .824                                      | .683              | .141             | 81.0                          | 88.1                                             | 72.0      | 16.1      |
| 6     | .640                                            | .720                                      | .545              | .175             | 85.3                          | 95.9                                             | 77.5      | 18.4      |
| 7     | .621                                            | .689                                      | .554              | .135             | 85.6                          | 97.3                                             | 77.8      | 19.5      |
| 8     | .610                                            | .673                                      | .554              | .119             | 85.5                          | 94.6                                             | 79.9      | 14.7      |
| 9     | <i>Sunday.</i>                                  |                                           |                   |                  |                               |                                                  |           |           |
| 10    | .627                                            | .700                                      | .557              | .143             | 85.6                          | 94.4                                             | 80.2      | 14.2      |
| 11    | .675                                            | .756                                      | .597              | .159             | 85.7                          | 91.8                                             | 78.8      | 16.0      |
| 12    | .724                                            | .813                                      | .633              | .180             | 85.5                          | 93.7                                             | 79.6      | 14.1      |
| 13    | .664                                            | .758                                      | .573              | .185             | 84.3                          | 92.2                                             | 75.6      | 16.6      |
|       | <i>Good</i>                                     |                                           |                   |                  |                               |                                                  |           |           |
| 14    | <i>Friday.</i>                                  |                                           |                   |                  |                               |                                                  |           |           |
| 15    | .731.                                           | .795                                      | .684              | .111             | 78.1                          | 77.8                                             | 69.6      | 8.2       |
| 16    | <i>Sunday.</i>                                  |                                           |                   |                  |                               |                                                  |           |           |
| 17    | .711                                            | .766                                      | .630              | .136             | 76.2                          | 82.4                                             | 72.0      | 10.4      |
| 18    | .767                                            | .823                                      | .717              | .106             | 80.2                          | 90.2                                             | 70.6      | 19.6      |
| 19    | .799                                            | .879                                      | .732              | .147             | 83.5                          | 92.0                                             | 77.0      | 15.0      |
| 20    | .765                                            | .852                                      | .668              | .184             | 83.2                          | 90.2                                             | 77.4      | 12.8      |
| 21    | .698                                            | .766                                      | .608              | .158             | 83.4                          | 91.2                                             | 77.8      | 13.4      |
| 22    | .659                                            | .736                                      | .510              | .226             | 81.8                          | 90.8                                             | 76.5      | 14.3      |
| 23    | <i>Sunday.</i>                                  |                                           |                   |                  |                               |                                                  |           |           |
| 24    | .642                                            | .717                                      | .568              | .149             | 84.2                          | 92.4                                             | 76.5      | 15.9      |
| 25    | .743                                            | .822                                      | .688              | .134             | 83.2                          | 91.0                                             | 77.9      | 13.1      |
| 26    | .779                                            | .856                                      | .697              | .159             | 85.4                          | 93.4                                             | 79.3      | 14.1      |
| 27    | .731                                            | .806                                      | .633              | .173             | 86.5                          | 93.6                                             | 81.0      | 12.6      |
| 28    | .637                                            | .710                                      | .551              | .159             | 86.7                          | 94.8                                             | 81.6      | 13.2      |
| 29    | .655                                            | .725                                      | .582              | .143             | 86.6                          | 93.8                                             | 81.0      | 12.8      |
| 30    | <i>Sunday.</i>                                  |                                           |                   |                  |                               |                                                  |           |           |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of April, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Thermometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew Point. | Mean Elastic force of Vapour. | Mean Weight of Vapour in a cubic foot of air. | Additional weight of Vapour required for complete saturation. | Mean degree of Humidity, complete saturation being unity. |
|-------|----------------------------|---------------------|---------------------|---------------------------|-------------------------------|-----------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|
| 1     | 74.1                       | 5.4                 | 71.4                | 8.1                       | 0.761                         | 8.22                                          | 2.44                                                          | 0.771                                                     |
| 2     | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 3     | 77.2                       | 4.4                 | 75.0                | 6.6                       | 0.854                         | 9.18                                          | 2.16                                                          | .810                                                      |
| 4     | 74.9                       | 4.0                 | 72.9                | 6.0                       | 0.797                         | 8.63                                          | 1.84                                                          | .824                                                      |
| 5     | 77.6                       | 3.4                 | 75.9                | 5.1                       | 0.879                         | 9.47                                          | 1.67                                                          | .850                                                      |
| 6     | 81.1                       | 4.2                 | 79.0                | 6.3                       | 0.970                         | 10.37                                         | 2.27                                                          | .820                                                      |
| 7     | 81.7                       | 3.9                 | 79.7                | 5.9                       | 0.992                         | 10.59                                         | 2.17                                                          | .830                                                      |
| 8     | 81.6                       | 3.9                 | 79.6                | 5.9                       | 0.989                         | 10.56                                         | 2.16                                                          | .830                                                      |
| 9     | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 10    | 81.5                       | 4.1                 | 79.4                | 6.2                       | 0.983                         | 10.49                                         | 2.27                                                          | .822                                                      |
| 11    | 77.6                       | 8.1                 | 73.5                | 12.2                      | 0.814                         | 8.69                                          | 4.11                                                          | .679                                                      |
| 12    | 80.6                       | 4.9                 | 78.1                | 7.4                       | 0.943                         | 10.08                                         | 2.64                                                          | .792                                                      |
| 13    | 79.7                       | 4.6                 | 77.4                | 6.9                       | 0.922                         | 9.87                                          | 2.41                                                          | .804                                                      |
| 14    | <i>Good Friday.</i>        |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 15    | 71.5                       | 1.6                 | 70.7                | 2.4                       | 0.744                         | 8.15                                          | 0.64                                                          | .927                                                      |
| 16    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 17    | 73.9                       | 2.3                 | 72.7                | 3.5                       | 0.792                         | 8.61                                          | 1.05                                                          | .891                                                      |
| 18    | 76.9                       | 3.3                 | 75.2                | 5.0                       | 0.860                         | 9.28                                          | 1.60                                                          | .853                                                      |
| 19    | 79.3                       | 4.2                 | 77.2                | 6.3                       | 0.916                         | 9.83                                          | 2.17                                                          | .819                                                      |
| 20    | 79.1                       | 4.1                 | 77.0                | 6.2                       | 0.910                         | 9.77                                          | 2.12                                                          | .822                                                      |
| 21    | 78.5                       | 4.9                 | 76.0                | 7.4                       | 0.882                         | 9.47                                          | 2.49                                                          | .792                                                      |
| 22    | 76.0                       | 5.8                 | 73.1                | 8.7                       | 0.803                         | 8.63                                          | 2.77                                                          | .757                                                      |
| 23    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |
| 24    | 79.6                       | 4.6                 | 77.3                | 6.9                       | 0.919                         | 9.84                                          | 2.40                                                          | .804                                                      |
| 25    | 79.1                       | 4.1                 | 77.0                | 6.2                       | 0.910                         | 9.77                                          | 2.12                                                          | .822                                                      |
| 26    | 81.0                       | 4.4                 | 78.8                | 6.6                       | 0.964                         | 10.29                                         | 2.39                                                          | .812                                                      |
| 27    | 82.4                       | 4.1                 | 80.3                | 6.2                       | 1.011                         | 10.78                                         | 2.32                                                          | .823                                                      |
| 28    | 82.5                       | 4.2                 | 80.4                | 6.3                       | 1.014                         | 10.81                                         | 2.37                                                          | .820                                                      |
| 29    | 81.7                       | 4.9                 | 79.2                | 7.4                       | 0.976                         | 10.41                                         | 2.73                                                          | .792                                                      |
| 30    | <i>Sunday.</i>             |                     |                     |                           |                               |                                               |                                                               |                                                           |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of April, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | o                          | o                                                        | o    | o     |
| Mid-night. | 29.723                                    | 29.882                                                 | 29.597  | 0.285   | 78.7                       | 82.8                                                     | 71.4 | 11.4  |
| 1          | .710                                      | .866                                                   | .598    | .268    | 78.4                       | 82.6                                                     | 70.7 | 11.9  |
| 2          | .698                                      | .862                                                   | .579    | .283    | 78.0                       | 82.2                                                     | 71.8 | 10.4  |
| 3          | .689                                      | .862                                                   | .567    | .295    | 77.8                       | 82.0                                                     | 72.0 | 10.0  |
| 4          | .696                                      | .875                                                   | .562    | .313    | 77.7                       | 82.2                                                     | 71.4 | 10.8  |
| 5          | .699                                      | .891                                                   | .585    | .306    | 77.5                       | 82.0                                                     | 70.5 | 11.5  |
| 6          | .718                                      | .901                                                   | .601    | .300    | 77.5                       | 81.7                                                     | 70.4 | 11.3  |
| 7          | .745                                      | .924                                                   | .637    | .287    | 78.3                       | 82.8                                                     | 71.8 | 11.0  |
| 8          | .766                                      | .954                                                   | .663    | .291    | 80.7                       | 85.2                                                     | 72.3 | 12.9  |
| 9          | .776                                      | .961                                                   | .671    | .290    | 83.2                       | 88.0                                                     | 74.2 | 13.8  |
| 10         | .775                                      | .961                                                   | .666    | .295    | 85.4                       | 90.2                                                     | 74.0 | 16.2  |
| 11         | .769                                      | .944                                                   | .669    | .275    | 87.1                       | 91.4                                                     | 72.2 | 19.2  |
| Noon.      | .743                                      | .920                                                   | .651    | .269    | 88.8                       | 93.0                                                     | 72.5 | 20.5  |
| 1          | .718                                      | .892                                                   | .618    | .274    | 89.9                       | 94.4                                                     | 73.3 | 21.1  |
| 2          | .688                                      | .849                                                   | .595    | .254    | 90.5                       | 96.0                                                     | 70.0 | 26.0  |
| 3          | .663                                      | .820                                                   | .562    | .258    | 90.8                       | 97.0                                                     | 71.2 | 25.8  |
| 4          | .643                                      | .797                                                   | .545    | .252    | 90.4                       | 97.3                                                     | 72.0 | 25.3  |
| 5          | .642                                      | .803                                                   | .549    | .254    | 89.1                       | 95.0                                                     | 72.0 | 23.0  |
| 6          | .660                                      | .817                                                   | .556    | .261    | 86.1                       | 91.3                                                     | 71.4 | 19.9  |
| 7          | .672                                      | .831                                                   | .510    | .321    | 83.6                       | 87.2                                                     | 70.7 | 16.5  |
| 8          | .694                                      | .837                                                   | .600    | .237    | 81.8                       | 85.8                                                     | 69.8 | 16.0  |
| 9          | .720                                      | .870                                                   | .612    | .258    | 80.9                       | 85.2                                                     | 69.8 | 15.4  |
| 10         | .731                                      | .876                                                   | .622    | .254    | 80.3                       | 84.6                                                     | 69.6 | 15.0  |
| 11         | .730                                      | .871                                                   | .608    | .263    | 79.4                       | 84.2                                                     | 69.7 | 14.5  |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of April, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|                | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| Mid-<br>night. | 76.5                            | 2.2                 | 75.4                | 3.3                          | 0.865                            | 9.37                                             | 1.04                                                                    | 0.900                                                               |
| 1              | 76.4                            | 2.0                 | 75.4                | 3.0                          | .865                             | .37                                              | 0.94                                                                    | .909                                                                |
| 2              | 76.2                            | 1.8                 | 75.3                | 2.7                          | .862                             | .34                                              | .85                                                                     | .917                                                                |
| 3              | 76.2                            | 1.6                 | 75.4                | 2.4                          | .865                             | .39                                              | .74                                                                     | .927                                                                |
| 4              | 76.2                            | 1.5                 | 75.4                | 2.3                          | .865                             | .39                                              | .71                                                                     | .930                                                                |
| 5              | 76.1                            | 1.4                 | 75.4                | 2.1                          | .865                             | .39                                              | .65                                                                     | .935                                                                |
| 6              | 76.2                            | 1.3                 | 75.5                | 2.0                          | .868                             | .42                                              | .62                                                                     | .938                                                                |
| 7              | 76.9                            | 1.4                 | 76.2                | 2.1                          | .887                             | .62                                              | .66                                                                     | .936                                                                |
| 8              | 78.4                            | 2.3                 | 77.2                | 3.5                          | .916                             | .87                                              | 1.17                                                                    | .894                                                                |
| 9              | 75.9                            | 3.7                 | 77.6                | 5.6                          | .928                             | .95                                              | .94                                                                     | .837                                                                |
| 10             | 80.4                            | 5.0                 | 77.9                | 7.5                          | .937                             | 10.00                                            | 2.68                                                                    | .789                                                                |
| 11             | 81.2                            | 5.9                 | 78.2                | 8.9                          | .946                             | .07                                              | 3.26                                                                    | .755                                                                |
| Noon.          | 81.8                            | 7.0                 | 78.3                | 10.5                         | .949                             | .05                                              | 3.95                                                                    | .718                                                                |
| 1              | 82.1                            | 7.8                 | 78.2                | 11.7                         | .946                             | .00                                              | 4.46                                                                    | .692                                                                |
| 2              | 82.1                            | 8.4                 | 77.9                | 12.6                         | .937                             | 9.90                                             | 4.82                                                                    | .673                                                                |
| 3              | 82.1                            | 8.7                 | 77.7                | 13.1                         | .931                             | .84                                              | 5.00                                                                    | .663                                                                |
| 4              | 81.8                            | 8.6                 | 77.5                | 12.9                         | .925                             | .78                                              | 4.89                                                                    | .667                                                                |
| 5              | 81.6                            | 7.5                 | 77.8                | 11.3                         | .934                             | .91                                              | 4.21                                                                    | .702                                                                |
| 6              | 79.7                            | 6.4                 | 76.5                | 9.6                          | .896                             | .56                                              | 3.39                                                                    | .738                                                                |
| 7              | 78.8                            | 4.8                 | 76.4                | 7.2                          | .893                             | .58                                              | 2.45                                                                    | .796                                                                |
| 8              | 77.7                            | 4.1                 | 75.6                | 6.2                          | .871                             | .37                                              | 2.03                                                                    | .822                                                                |
| 9              | 77.4                            | 3.5                 | 75.6                | 5.3                          | .871                             | .39                                              | 1.71                                                                    | .846                                                                |
| 10             | 77.2                            | 3.1                 | 75.6                | 4.7                          | .871                             | .39                                              | 1.52                                                                    | .861                                                                |
| 11             | 76.8                            | 2.6                 | 75.5                | 3.9                          | .868                             | .38                                              | 1.24                                                                    | .883                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of April, 1854.*

Solar radiation, Weather, &c.

| Date. | Max Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                                                                              |
|-------|----------------------|-------|-----------------------------------|---------------------------------------------------------------------------------------------------------|
|       | 0                    | Inc.  |                                   |                                                                                                         |
| 1     | 144.0                | ..    | S. E. or E or N. W.               | Cloudless                                                                                               |
| 2     | Sunday.              |       |                                   |                                                                                                         |
| 3     | 129.6                | ..    | S. or S. E.                       | Cloudless till 8 A. M. scattered ☁ till 4 P. M. cloudless till 9 P. M. overcast and raining afterwards. |
| 4     | 126.0                | 0.94  | S. E. or S.                       | Cloudy till 3 A. M. cloudless till 11 A. M. cloudy afterwards, with drizzling between 6 and 7 P. M.     |
| 5     | 130.4                | 0.18  | S. or S. E.                       | Cloudless till 5 A. M. cloudy till 8 P. M. cloudless afterwards.                                        |
| 6     | 142.0                | ..    | S. or S. E.                       | Cloudless.                                                                                              |
| 7     | 145.0                | ..    | S. E. or S. W.                    | Nearly cloudless the whole day.                                                                         |
| 8     | 144.2                | ..    | S. W. or S. or E.                 | Scattered ☁ or cloudless.                                                                               |
| 9     | Sunday.              |       |                                   |                                                                                                         |
| 10    | 130.0                | ..    | S. E. or S.                       | Cloudy till 6 P. M. cloudless afterwards.                                                               |
| 11    | 139.5                | ..    | S.                                | Cloudless till 7 A. M. scattered ☁ or ☁ till 6 P. M. cloudless till 9 P. M. scattered ☁ afterwards.     |
| 12    | 143.0                | ..    | S.                                | Nearly cloudy the whole day.                                                                            |
| 13    | 127.0                | ..    | S.                                | Nearly cloudy the whole day.                                                                            |
| 14    | Good Friday.         |       |                                   |                                                                                                         |
| 15    | ..                   | 4.13  | S. or S. E.                       | Overcast, and also raining from 9 A. M. to 2 P. M.                                                      |
| 16    | Sunday               | 1.44  |                                   |                                                                                                         |
| 17    | ..                   | ..    | S. or E.                          | Nearly cloudy the whole day.                                                                            |
| 18    | 145.0                | 0.56  | N. E. or E. or S.                 | Overcast and raining till 5 A. M. cloudless till 11 A. M. cloudy till 5 P. M. cloudless afterwards.     |
| 19    | 149.5                | ..    | Calm or S. or S. E.               | Cloudless till 7 A. M. scattered ☁ or ☁ or ☁ till 7 P. M. cloudless afterwards.                         |
| 20    | 136.2                | ..    | S. or S. E.                       | Cloudy till 3 A. M. cloudless till 7 A. M. scattered ☁ or ☁ till 4 P. M. cloudless afterwards.          |
| 21    | 130.5                | ..    | S. E. or S.                       | Scattered ☁ till 11 A. M. cloudless till 3 P. M. scattered ☁ till 7 P. M. cloudless afterwards.         |
| 22    | 126.0                | ..    | S. or S. E.                       | Cloudless till 6 A. M. cloudy afterwards.                                                               |
| 23    | Sunday.              |       |                                   |                                                                                                         |
| 24    | 141.0                | ..    | S. E. or W. or N. E.              | Cloudless till 7 A. M. scattered ☁ till 4 P. M. cloudless afterwards.                                   |
| 25    | 126.0                | ..    | S. or N. E. or E.                 | Cloudless till 6 A. M. scattered ☁ or ☁ till 7 P. M. cloudless afterwards.                              |
| 26    | 136.4                | ..    | Calm or S.                        | Cloudless till 6 A. M. scattered ☁ or ☁ till 6 P. M. cloudless afterwards.                              |
| 27    | 137.0                | ..    | S. or S. E.                       | Scattered clouds of various kinds.                                                                      |
| 28    | 142.0                | ..    | S.                                | Cloudless. [cloudy afterwards.                                                                          |
| 29    | 145.0                | ..    | S.                                | Cloudless till 3 A. M. scattered ☁ or ☁                                                                 |
| 30    | Sunday.              |       |                                   |                                                                                                         |

☁ Cirri, ☁ cirro-strati, ☁ cumuli, ☁ cumulo-strati, ☁ nimbi,—i strati, ☁ i cirro-cumuli.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of June, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.    |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|-----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                       |
| 1     | 29.135     | 106.9        | 106.9   | 69.5      | ..                   | ..       | N. W.                  | Clear                 |
| 2     | 29.135     | 102.5        | 102.8   | 76.3      | ..                   | ..       | N. W.                  | Ditto                 |
| 3     | 29.157     | 102.7        | 103.7   | 75.6      | ..                   | ..       | N.                     | Ditto                 |
| 4     | 29.157     | 102.9        | 103.8   | 76.0      | ..                   | ..       | W.                     | Ditto                 |
| 5     | 29.155     | 103.0        | 103.5   | 77.2      | ..                   | ..       | N. W.                  | Ditto                 |
| 6     | 29.135     | 103.8        | 104.9   | 75.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 7     | 29.093     | 104.5        | 104.9   | 75.6      | ..                   | ..       | N. W.                  | Ditto                 |
| 8     | 29.131     | 103.5        | 103.3   | 78.2      | ..                   | ..       | N. W.                  | Ditto                 |
| 9     | 29.167     | 99.8         | 100.3   | 81.0      | ..                   | ..       | W.                     | ~ scattered in zenith |
| 10    | 29.185     | 97.2         | 98.2    | 79.5      | ..                   | ..       | N. W.                  | Clear                 |
| 11    | 29.131     | 99.9         | 100.8   | 80.0      | ..                   | ..       | W.                     | ~ scattered           |
| 12    | 29.069     | 102.0        | 102.2   | 80.9      | ..                   | ..       | N. W.                  | Clear                 |
| 13    | 29.025     | 98.8         | 98.8    | 82.0      | ..                   | ..       | S. W.                  | Hazy                  |
| 14    | 29.113     | 86.7         | 86.0    | 80.1      | ..                   | ..       | S. E.                  | ~ all over            |
| 15    | 29.155     | 88.5         | 89.1    | 79.4      | ..                   | ..       | N. W.                  | ~ Ditto               |
| 16    | 29.137     | 96.5         | 97.5    | 80.4      | ..                   | ..       | W.                     | Clear                 |
| 17    | 29.111     | 97.8         | 98.0    | 80.0      | ..                   | ..       | N. W.                  | Ditto                 |
| 18    | 29.143     | 93.0         | 93.9    | 80.0      | ..                   | ..       | E.                     | ~ scattered           |
| 19    | 29.149     | 90.0         | 88.9    | 80.0      | ..                   | ..       | E.                     | ~ all over            |
| 20    | 29.155     | 91.5         | 92.0    | 81.0      | ..                   | ..       | S. E.                  | ~ Ditto               |
| 21    | 29.147     | 92.5         | 93.2    | 80.2      | ..                   | ..       | S. E.                  | ~ in zenith ~ Hazy    |
| 22    | 29.097     | 92.2         | 93.3    | 81.0      | ..                   | ..       | W.                     | ~ all over            |
| 23    | 29.075     | 90.1         | 91.2    | 83.3      | ..                   | ..       | W.                     | ~ Ditto               |
| 24    | 29.055     | 85.0         | 84.0    | 81.0      | ..                   | ..       | E.                     | ~ Ditto               |
| 25    | 29.205     | 85.0         | 84.0    | 81.5      | ..                   | ..       | ..                     | ~ Ditto               |
| 26    | 29.211     | 85.0         | 85.5    | 81.0      | ..                   | ..       | S. E.                  | ~ Ditto               |
| 27    | 29.267     | 90.0         | 90.5    | 80.0      | ..                   | ..       | S. E.                  | ~ scattered           |
| 28    | 29.197     | 88.2         | 87.7    | 83.0      | ..                   | ..       | S. E.                  | ~ all over            |
| 29    | 29.125     | 86.0         | 86.6    | 82.0      | ..                   | ..       | E.                     | ~ Ditto               |
| 30    | 29.123     | 85.8         | 86.4    | 82.4      | ..                   | ..       | N. E.                  | ~ scattered all over  |
| Mean. | 29.38      | 95.0         | 95.396  | 79.436    | ..                   | ..       |                        | ..                    |

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6, at times it is far greater.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of June, 1854.*

| Observations at apparent Noon. |            |              |         |           |                      |          |                        |                      |
|--------------------------------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
| Date.                          | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|                                |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1                              | 29.121     | 110.0        | 110.0   | 69.5      | ..                   | ..       | N. W.                  | Clear                |
| 2                              | 29.109     | 107.2        | 107.5   | 77.2      | ..                   | ..       | N. W.                  | Ditto                |
| 3                              | 29.141     | 105.5        | 105.5   | 77.3      | ..                   | ..       | N. W.                  | Ditto                |
| 4                              | 29.139     | 105.8        | 106.4   | 77.6      | ..                   | ..       | W.                     | Ditto                |
| 5                              | 29.125     | 106.6        | 107.2   | 77.5      | ..                   | ..       | N. W.                  | Ditto                |
| 6                              | 29.117     | 108.2        | 109.4   | 76.0      | ..                   | ..       | N. W.                  | Ditto                |
| 7                              | 29.077     | 108.9        | 108.7   | 76.0      | ..                   | ..       | N. W.                  | Ditto                |
| 8                              | 29.105     | 106.6        | 107.1   | 81.0      | ..                   | ..       | N. W.                  | Ditto                |
| 9                              | 29.137     | 104.0        | 105.3   | 81.7      | ..                   | ..       | W.                     | Ditto                |
| 10                             | 29.175     | 102.8        | 103.8   | 79.5      | ..                   | ..       | N. W.                  | Ditto                |
| 11                             | 29.108     | 107.0        | 108.0   | 80.5      | ..                   | ..       | N. W.                  | ~ to E.              |
| 12                             | 29.045     | 104.3        | 104.8   | 80.5      | ..                   | ..       | N. W.                  | Clear                |
| 13                             | 29.009     | 101.5        | 101.2   | 82.4      | ..                   | ..       | S. W.                  | Hazy                 |
| 14                             | 29.129     | 89.0         | 88.3    | 81.4      | ..                   | ..       | N.                     | ~ all over           |
| 15                             | 29.155     | 92.0         | 93.0    | 79.5      | ..                   | ..       | S. W.                  | ~ Ditto              |
| 16                             | 29.131     | 99.1         | 99.3    | 80.4      | ..                   | ..       | W.                     | ~ scattered          |
| 17                             | 29.089     | 100.9        | 101.6   | 80.4      | ..                   | ..       | W.                     | Clear                |
| 18                             | 29.115     | 97.0         | 98.0    | 80.5      | ..                   | ..       | E.                     | ~ scattered          |
| 19                             | 29.105     | 93.9         | 94.0    | 79.0      | ..                   | ..       | W.                     | ~ all over           |
| 20                             | 29.141     | 93.8         | 94.5    | 81.8      | ..                   | ..       | N. W.                  | ~ scattered          |
| 21                             | 29.141     | 65.7         | 96.2    | 81.5      | ..                   | ..       | W.                     | ~ no zenith          |
| 22                             | 29.097     | 96.6         | 97.3    | 83.2      | ..                   | ..       | S. W.                  | ~ all over           |
| 23                             | 29.069     | 95.2         | 95.7    | 81.5      | ..                   | ..       | W.                     | ~ Ditto              |
| 24                             | 29.147     | 85.9         | 83.3    | 81.0      | ..                   | ..       | E.                     | ~ raining            |
| 25                             | 29.177     | 86.0         | 85.2    | 81.5      | ..                   | ..       | ..                     | ~ all over           |
| 26                             | 29.193     | 87.0         | 87.2    | 81.0      | ..                   | ..       | S. E.                  | ~ scattered all over |
| 27                             | 29.141     | 92.0         | 92.5    | 81.8      | ..                   | ..       | S.                     | ~ scattered          |
| 28                             | 29.175     | 85.0         | 82.0    | 80.0      | ..                   | ..       | N. E.                  | ~ raining            |
| 29                             | 29.117     | 88.8         | 89.5    | 82.8      | ..                   | ..       | E.                     | ~ all over           |
| 30                             | 29.085     | 86.9         | 87.3    | 82.0      | ..                   | ..       | N. W.                  | ~ scattered all over |
| Mean.                          | 29.120     | 98.1         | 98.32   | 79.866    | ..                   | ..       | ..                     |                      |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of June, 1854.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |        | Aspect of the Sky. | Rain Gauge.                  |                         |
|-------|------------|--------------|---------|-----------|----------------------|----------|--------|--------------------|------------------------------|-------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean.  |                    | 3 Ft. 2 In. from the ground. | Direction of the Winds. |
| 1     | 29.059     | 112.6        | 111.8   | 67.9      | 111.0                | 96.8     | 103.9  | Clear              | ..                           | N.W.                    |
| 2     | 29.015     | 106.0        | 105.0   | 76.6      | 105.0                | 92.5     | 98.75  | Ditto              | ..                           | N.                      |
| 3     | 29.065     | 110.0        | 110.0   | 80.0      | 109.2                | 91.0     | 100.1  | Ditto              | ..                           | N.W.                    |
| 4     | 29.057     | 111.5        | 112.2   | 78.7      | 112.0                | 91.6     | 101.8  | Ditto              | ..                           | W.                      |
| 5     | 29.025     | 112.0        | 112.3   | 77.3      | 111.0                | 92.3     | 101.65 | Ditto              | ..                           | N.W.                    |
| 6     | 29.015     | 111.0        | 110.5   | 75.5      | 109.5                | 94.5     | 102.0  | Ditto              | ..                           | N.W.                    |
| 7     | 28.993     | 112.0        | 112.2   | 76.9      | 112.0                | 98.0     | 105.0  | Ditto              | ..                           | N.W.                    |
| 8     | 29.027     | 110.0        | 108.3   | 79.0      | 108.0                | 96.7     | 102.35 | ~ all over         | ..                           | N.W.                    |
| 9     | 29.103     | 103.0        | 98.9    | 80.7      | 100.0                | 90.5     | 95.25  | ~ Ditto            | 0.34                         | N. E.                   |
| 10    | 29.063     | 108.0        | 108.3   | 82.7      | 107.0                | 80.0     | 93.5   | Clear              | ..                           | N.W.                    |
| 11    | 28.993     | 108.0        | 108.6   | 81.3      | 107.5                | 91.5     | 99.5   | ~ to E.            | ..                           | W.                      |
| 12    | 28.947     | 107.8        | 107.5   | 82.2      | 106.5                | 92.0     | 99.25  | Clear              | ..                           | N.W.                    |
| 13    | 28.937     | 103.5        | 95.5    | 81.0      | 98.0                 | 95.0     | 96.5   | Hazy               | ..                           | N.                      |
| 14    | 29.051     | 93.7         | 93.5    | 80.4      | 93.0                 | 80.0     | 86.5   | ~ scattered        | 0.85                         | N.                      |
| 15    | 29.103     | 97.3         | 96.0    | 81.6      | 96.0                 | 86.0     | 91.0   | ~ all over         | ..                           | W.                      |
| 16    | 29.059     | 97.0         | 94.4    | 84.0      | 94.0                 | 86.5     | 90.25  | ~ Ditto            | ..                           | S.W.                    |
| 17    | 29.017     | 104.7        | 105.2   | 81.8      | 104.2                | 89.5     | 96.85  | ~ scattered        | ..                           | N.W.                    |
| 18    | 29.065     | 100.0        | 101.0   | 82.0      | 103.0                | 89.0     | 96.0   | ~ Ditto            | ..                           | E.                      |
| 19    | 29.041     | 97.0         | 97.3    | 79.5      | 96.0                 | 88.0     | 92.0   | ~ all over         | ..                           | W.                      |
| 20    | 29.073     | 98.5         | 98.0    | 82.5      | 98.0                 | 87.0     | 92.5   | ~ scattered        | ..                           | N.                      |
| 21    | 29.921     | 100.9        | 101.0   | 82.5      | 100.0                | 87.0     | 93.5   | Hazy               | ..                           | N.                      |
| 22    | 29.005     | 97.2         | 94.8    | 81.2      | 95.2                 | 88.0     | 91.6   | ~ all over         | ..                           | N.                      |
| 23    | 28.977     | 100.6        | 100.4   | 81.7      | 99.5                 | 84.0     | 91.75  | Ditto              | 0.20                         | W.                      |
| 24    | 29.069     | 85.1         | 84.5    | 81.0      | 84.2                 | 83.9     | 84.05  | Ditto              | 0.30                         | W.                      |
| 25    | 29.135     | 90.2         | 91.0    | 82.0      | 89.9                 | 82.0     | 85.95  | Ditto              | 0.68                         | ..                      |
| 26    | 29.105     | 91.1         | 91.9    | 82.5      | 91.0                 | 80.0     | 85.5   | ~ scattered        | ..                           | S. E.                   |
| 27    | 29.091     | 88.0         | 86.4    | 81.0      | 91.0                 | 84.5     | 88.25  | ~ all over         | ..                           | S. E.                   |
| 28    | 29.129     | 84.8         | 82.4    | 79.0      | 82.1                 | 85.0     | 83.55  | ~ Ditto            | 1.10                         | N. E.                   |
| 29    | 29.095     | 82.1         | 81.1    | 79.1      | 89.5                 | 81.8     | 85.65  | ~ Ditto            | 1.10                         | E.                      |
| 30    | 29.037     | 84.9         | 84.5    | 81.0      | 85.5                 | 80.5     | 83.0   | ~ scattered        | ..                           | N.W.                    |
|       |            |              |         |           |                      |          |        | all over           | 0.38                         | N.W.                    |
| Mn.   | 29.045     | 100.28       | 99.48   | 80.12     | 99.62                | 88.17    | 93.89  | ..                 | 5.05                         | ..                      |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of July, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.           |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|------------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                              |
| 1     | 29.149     | 85.8         | 85.8    | 80.5      | ..                   | ..       | N.                     | scattered                    |
| 2     | 29.149     | 85.0         | 85.2    | 80.0      | ..                   | ..       | N. E.                  | ditto                        |
| 3     | 29.211     | 90.0         | 90.6    | 82.6      | ..                   | ..       | E.                     | towards h. and in zenith     |
| 4     | 29.203     | 90.5         | 91.0    | 82.5      | ..                   | ..       | E.                     | towards do. in zenith        |
| 5     | 29.195     | 89.0         | 89.2    | 81.5      | ..                   | ..       | N. E.                  | scattered                    |
| 6     | 29.063     | 87.8         | 88.0    | 80.8      | ..                   | ..       | N. E.                  | ditto                        |
| 7     | 29.087     | 89.0         | 88.0    | 80.3      | ..                   | ..       | N. W.                  | all over                     |
| 8     | 29.101     | 89.9         | 90.7    | 76.9      | ..                   | ..       | N.                     | scattered                    |
| 9     | 29.131     | 91.0         | 91.3    | 80.6      | ..                   | ..       | N. W.                  | .....                        |
| 10    | 29.147     | 92.5         | 93.4    | 79.4      | ..                   | ..       | N. W.                  | Clear                        |
| 11    | 29.131     | 91.0         | 91.5    | 79.9      | ..                   | ..       | N. W.                  | Ditto                        |
| 12    | 29.079     | 96.5         | 97.9    | 80.0      | ..                   | ..       | N. W.                  | Ditto                        |
| 13    | 29.117     | 85.0         | 82.5    | 78.4      | ..                   | ..       | E.                     | all over                     |
| 14    | 29.139     | 89.0         | 89.9    | 80.6      | ..                   | ..       | E.                     | scattered                    |
| 15    | 29.167     | 89.5         | 87.3    | 83.3      | ..                   | ..       | E.                     | all over                     |
| 16    | 29.163     | 85.2         | 84.0    | 80.0      | ..                   | ..       | N. E.                  | ditto                        |
| 17    | 29.051     | 86.5         | 87.0    | 82.0      | ..                   | ..       | S. E.                  | ditto                        |
| 18    | 29.097     | 85.0         | 85.0    | 81.2      | ..                   | ..       | S. E.                  | scattered all over           |
| 19    | 29.171     | 84.1         | 83.1    | 81.1      | ..                   | ..       | N. W.                  | all over                     |
| 20    | 29.145     | 87.9         | 88.3    | 81.0      | ..                   | ..       | E.                     | all over                     |
| 21    | 29.153     | 89.3         | 90.4    | 81.9      | ..                   | ..       | S. E.                  | scattered                    |
| 22    | 29.255     | 91.0         | 91.5    | 83.5      | ..                   | ..       | S. E.                  | ditto                        |
| 23    | 29.274     | 90.5         | 91.0    | 81.0      | ..                   | ..       | E.                     | ditto                        |
| 24    | 29.171     | 91.5         | 91.2    | 83.5      | ..                   | ..       | N. E.                  | all over                     |
| 25    | 29.155     | 87.8         | 88.2    | 81.7      | ..                   | ..       | E.                     | scattered in h. towards hor. |
| 26    | 29.195     | 86.5         | 86.4    | 81.0      | ..                   | ..       | N.                     | all over                     |
| 27    | 29.115     | 87.5         | 87.5    | 80.0      | ..                   | ..       | E.                     | ditto                        |
| 28    | 29.047     | 86.9         | 86.9    | 78.6      | ..                   | ..       | S. E.                  | ditto                        |
| 29    | 29.081     | 80.5         | 80.7    | 78.4      | ..                   | ..       | S. E.                  | ditto                        |
| 30    | 29.093     | 83.0         | 83.6    | 79.0      | ..                   | ..       | W.                     | scattered                    |
| 31    | 29.103     | 82.0         | 82.2    | 78.0      | ..                   | ..       | E.                     | ditto                        |
| Mean. | 29.139     | 88.0         | 88.1    | 80.6      | ..                   | ..       | ..                     | .....                        |

Barometer observations corrected for capillarity only.

Symbols, {  
 \ Cirris.  
 \ Cirro strata.  
 > Cumuli.  
 > Cumulo strata.  
 \ Nimbi or Nimbus.

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of July, 1854.*

## Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.                   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                                      |
| 1     | 29.135     | 86.5         | 86.2    | 81.0      | ..                   | ..       | N.                     | ↘ towards E. S. W. &<br>↘ towards N. |
| 2     | 29.133     | 87.0         | 87.3    | 81.6      | ..                   | ..       | E.                     | ↘ scattered                          |
| 3     | 29.203     | 91.7         | 91.9    | 82.8      | ..                   | ..       | E.                     | ↘ all over                           |
| 4     | 29.191     | 91.2         | 90.2    | 82.6      | ..                   | ..       | E.                     | ↘ ditto                              |
| 5     | 29.183     | 89.7         | 90.0    | 82.0      | ..                   | ..       | N.                     | ↘ scattered                          |
| 6     | 29.035     | 92.0         | 93.0    | 81.8      | ..                   | ..       | N.                     | ↘ ditto                              |
| 7     | 29.077     | 91.3         | 91.6    | 77.9      | ..                   | ..       | N.                     | ↘ ditto                              |
| 8     | 29.107     | 92.7         | 93.1    | 77.3      | ..                   | ..       | N. W.                  | ↘ ditto                              |
| 9     | 29.111     | 95.9         | 96.7    | 81.2      | ..                   | ..       | N. W.                  | ↘ ditto all over                     |
| 10    | 29.147     | 95.5         | 96.4    | 80.0      | ..                   | ..       | N. W.                  | ↘ scattered                          |
| 11    | 29.115     | 96.3         | 97.3    | 81.2      | ..                   | ..       | N. W.                  | ↘ ditto                              |
| 12    | 29.057     | 100.0        | 100.4   | 80.2      | ..                   | ..       | N.                     | ↘ ditto                              |
| 13    | 29.113     | 86.2         | 85.1    | 77.9      | ..                   | ..       | E.                     | ↘ all over                           |
| 14    | 29.107     | 92.0         | 92.8    | 80.9      | ..                   | ..       | N. E.                  | ↘ scattered                          |
| 15    | 29.137     | 90.8         | 91.5    | 81.3      | ..                   | ..       | S. E.                  | ↘ all over                           |
| 16    | 29.089     | 86.0         | 84.0    | 80.0      | ..                   | ..       | N. E.                  | ↘ ditto                              |
| 17    | 29.027     | 89.9         | 90.0    | 82.4      | ..                   | ..       | N. W.                  | ↘ ditto                              |
| 18    | 29.069     | 86.6         | 86.6    | 81.5      | ..                   | ..       | S. E.                  | ↘ scattered all over                 |
| 19    | 29.147     | 85.7         | 86.3    | 81.5      | ..                   | ..       | N. E.                  | ↘ all over                           |
| 20    | 29.119     | 90.0         | 90.8    | 82.0      | ..                   | ..       | N. E.                  | ↘ ditto                              |
| 21    | 29.131     | 92.0         | 92.4    | 81.0      | ..                   | ..       | E.                     | ↘ scattered                          |
| 22    | 29.229     | 93.7         | 94.0    | 83.0      | ..                   | ..       | S. E.                  | ↘ all over                           |
| 23    | 29.209     | 94.5         | 95.6    | 82.0      | ..                   | ..       | N. E.                  | ↘ scattered                          |
| 24    | 29.145     | 92.5         | 92.0    | 84.5      | ..                   | ..       | E.                     | ↘ all over                           |
| 25    | 29.143     | 90.3         | 90.8    | 82.5      | ..                   | ..       | E.                     | ↘ towards hor.                       |
| 26    | 29.175     | 87.7         | 87.8    | 81.9      | ..                   | ..       | E.                     | ↘ all over                           |
| 27    | 29.097     | 89.6         | 90.2    | 80.0      | ..                   | ..       | E.                     | ↘ all over                           |
| 28    | 29.029     | 89.5         | 90.2    | 80.0      | ..                   | ..       | E.                     | ↘ ditto                              |
| 29    | 29.077     | 82.0         | 83.3    | 78.9      | ..                   | ..       | S. E.                  | ↘ ditto                              |
| 30    | 29.075     | 91.0         | 91.5    | 80.3      | ..                   | ..       | N. W.                  | ↘ scattered                          |
| 31    | 29.085     | 90.2         | 90.4    | 80.5      | ..                   | ..       | E.                     | ↘ scattered                          |
| Mean. | 29.119     | 90.6         | 90.9    | 81.0      | ..                   | ..       | ..                     | .....                                |

*Meteorological Register kept at the Office of the Secretary to Government N. W. P. Agra, for the Month of July, 1854.*

| Minimum pressure observed at 4 P. M. |            |              |         |           |                      |          |       |                           |                        |                              |  |
|--------------------------------------|------------|--------------|---------|-----------|----------------------|----------|-------|---------------------------|------------------------|------------------------------|--|
| Date.                                | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.        | Rain Gauges.           |                              |  |
|                                      |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                           | Direction of the Wind. | 3 Ft. 2 In. from the ground. |  |
| 1                                    | 29.063     | 91.7         | 92.5    | 82.5      | 91.5                 | 81.5     | 86.5  | ~ scattered               | ..                     | N.                           |  |
| 2                                    | 29.065     | 90.5         | 91.0    | 82.7      | 90.0                 | 80.6     | 85.3  | ditto                     | ..                     | E.                           |  |
| 3                                    | 29.141     | 96.5         | 96.7    | 83.2      | 97.0                 | 84.0     | 90.5  | ~ all over                | ..                     | E.                           |  |
| 4                                    | 29.111     | 89.5         | 88.7    | 81.0      | 88.0                 | 84.0     | 86.0  | ~ towards E.              | ..                     | N. E.                        |  |
| 5                                    | 29.103     | 92.0         | 92.5    | 82.3      | 92.5                 | 84.0     | 88.25 | ~ scattered               | ..                     | N. E.                        |  |
| 6                                    | 28.967     | 96.9         | 97.1    | 83.7      | 96.2                 | 83.5     | 89.85 | ditto                     | ..                     | S. W.                        |  |
| 7                                    | 28.935     | 95.1         | 95.7    | 79.9      | 95.0                 | 81.5     | 89.75 | ~ in zenith               | ..                     | N. W.                        |  |
| 8                                    | 29.027     | 97.0         | 96.8    | 80.4      | 95.5                 | 85.5     | 90.5  | ~ scattered               | ..                     | N. W.                        |  |
| 9                                    | 29.049     | 89.7         | 88.7    | 79.5      | 96.0                 | 85.0     | 90.5  | ~ all over                | ..                     | N. W.                        |  |
| 10                                   | 29.036     | 99.5         | 99.5    | 81.1      | 98.0                 | 85.5     | 91.75 | ~ ditto                   | ..                     | N.                           |  |
| 11                                   | 29.025     | 101.9        | 102.3   | 81.8      | 100.5                | 87.5     | 94.0  | ~ ditto                   | ..                     | N. W.                        |  |
| 12                                   | 28.963     | 103.6        | 103.3   | 82.0      | 101.5                | 89.0     | 95.25 | ~ ditto                   | ..                     | N.                           |  |
| 13                                   | 29.053     | 89.5         | 89.0    | 79.0      | 90.0                 | 82.8     | 86.4  | ~ ditto                   | ..                     | E.                           |  |
| 14                                   | 29.039     | 90.5         | 89.4    | 80.9      | 92.5                 | 86.0     | 89.25 | ~ towards W & ~ scattered | ..                     | E.                           |  |
| 15                                   | 29.053     | 88.8         | 89.0    | 84.1      | 90.0                 | 88.0     | 89.0  | ~ all over                | 0572                   | E.                           |  |
| 16                                   | 29.015     | 85.8         | 82.5    | 79.2      | 84.0                 | 84.5     | 84.25 | ~ ditto                   | ..                     | N.                           |  |
| 17                                   | 28.945     | 81.5         | 81.5    | 80.0      | 88.0                 | 81.0     | 84.5  | ~ ditto                   | 2022                   | N. W.                        |  |
| 18                                   | 28.985     | 89.6         | 90.3    | 81.1      | 89.0                 | 79.5     | 84.25 | ~ sc. all over            | ..                     | N. E.                        |  |
| 19                                   | 29.057     | 89.0         | 88.9    | 84.0      | 89.0                 | 80.8     | 84.9  | ~ ditto                   | ..                     | N. E.                        |  |
| 20                                   | 29.033     | 92.5         | 92.6    | 81.5      | 92.0                 | 81.5     | 86.75 | ~ all over                | ..                     | E.                           |  |
| 21                                   | 29.061     | 94.8         | 94.8    | 81.3      | 94.0                 | 83.2     | 88.6  | ~ scattered               | ..                     | E.                           |  |
| 22                                   | 29.147     | 95.7         | 95.9    | 82.5      | 95.0                 | 84.5     | 89.75 | ~ all over                | ..                     | E.                           |  |
| 23                                   | 29.113     | 97.8         | 97.8    | 82.6      | 97.2                 | 87.0     | 92.1  | ~ scattered               | ..                     | N. E.                        |  |
| 24                                   | 29.099     | 93.6         | 88.9    | 80.9      | 90.5                 | 89.0     | 89.75 | ~ all over                | 0352                   | E.                           |  |
| 25                                   | 29.059     | 90.7         | 87.7    | 81.8      | 90.0                 | 81.5     | 85.75 | ~ towards W               | 0072                   | W.                           |  |
| 26                                   | 29.065     | 86.9         | 86.6    | 80.5      | 87.0                 | 82.0     | 84.5  | ~ all over                | ..                     | S. E.                        |  |
| 27                                   | 29.023     | 92.0         | 92.3    | 81.7      | 91.5                 | 82.5     | 87.0  | ~ scattered               | ..                     | S. E.                        |  |
| 28                                   | 28.945     | 92.2         | 92.7    | 80.1      | 91.3                 | 82.5     | 86.9  | ~ ditto                   | ..                     | S. E.                        |  |
| 29                                   | 29.047     | 84.2         | 84.2    | 79.2      | 83.4                 | 78.0     | 80.7  | ~ all over                | ..                     | S. E.                        |  |
| 30                                   | 29.013     | 94.0         | 94.7    | 95.0      | 95.0                 | 79.5     | 87.25 | ~ scattered               | ..                     | N. W.                        |  |
| 31                                   | 29.013     | 93.5         | 93.0    | 80.9      | 94.0                 | 80.0     | 87.0  | ~ scattered               | ..                     | E.                           |  |
| Mn.                                  | 29.041     | 92.4         | 92.1    | 81.8      | 92.4                 | 83.5     | 87.95 | ....                      | 3072                   | ..                           |  |





*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of May, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |         | Mean Dry Bulb<br>Thermometer. | Range of the Tempe-<br>rature during<br>the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|---------|-------------------------------|--------------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.   |                               | Max.                                             | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches. | o                             | o                                                | o    | o     |
| 1     | 29.755                                          | 29.843                                    | 29.661  | 0.182   | 85.5                          | 92.7                                             | 76.7 | 16.0  |
| 2     | .847                                            | .975                                      | .742    | .233    | 80.5                          | 90.4                                             | 70.7 | 19.7  |
| 3     | .883                                            | .955                                      | .780    | .185    | 78.9                          | 89.8                                             | 70.8 | 19.0  |
| 4     | .847                                            | .934                                      | .769    | .165    | 82.1                          | 91.4                                             | 72.6 | 18.8  |
| 5     | .800                                            | .893                                      | .674    | .219    | 80.4                          | 91.9                                             | 70.0 | 21.9  |
| 6     | .801                                            | .912                                      | .727    | .185    | 80.6                          | 89.3                                             | 72.0 | 17.3  |
| 7     | <i>Sunday.</i>                                  |                                           |         |         |                               |                                                  |      |       |
| 8     | .767                                            | .838                                      | .665    | .173    | 83.2                          | 93.9                                             | 75.7 | 18.2  |
| 9     | .749                                            | .833                                      | .661    | .172    | 82.6                          | 91.8                                             | 75.2 | 16.6  |
| 10    | .731                                            | .792                                      | .665    | .127    | 84.9                          | 93.3                                             | 76.8 | 16.5  |
| 11    | .765                                            | .834                                      | .696    | .138    | 86.9                          | 95.6                                             | 80.4 | 15.2  |
| 12    | .764                                            | .839                                      | .690    | .149    | 88.0                          | 98.6                                             | 81.4 | 17.2  |
| 13    | .746                                            | .815                                      | .677    | .138    | 87.2                          | 94.3                                             | 81.4 | 12.9  |
| 14    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                                  |      |       |
| 15    | .784                                            | .852                                      | .688    | .164    | 86.6                          | 94.4                                             | 79.4 | 15.0  |
| 16    | .767                                            | .846                                      | .708    | .138    | 86.9                          | 93.4                                             | 80.8 | 12.6  |
| 17    | .789                                            | .867                                      | .703    | .164    | 87.1                          | 94.6                                             | 81.8 | 12.8  |
| 18    | .807                                            | .874                                      | .717    | .157    | 87.8                          | 95.6                                             | 81.3 | 14.3  |
| 19    | .759                                            | .841                                      | .652    | .189    | 88.6                          | 97.6                                             | 82.8 | 14.8  |
| 20    | .703                                            | .785                                      | .609    | .176    | 89.9                          | 100.4                                            | 82.4 | 18.0  |
| 21    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                                  |      |       |
| 22    | .616                                            | .699                                      | .519    | .180    | 90.2                          | 100.0                                            | 82.4 | 17.6  |
| 23    | .533                                            | .664                                      | .508    | .156    | 89.8                          | 99.6                                             | 82.2 | 17.4  |
| 24    | .555                                            | .631                                      | .467    | .164    | 89.5                          | 99.6                                             | 82.9 | 16.7  |
| 25    | .507                                            | .589                                      | .404    | .185    | 90.3                          | 100.7                                            | 82.0 | 18.7  |
| 26    | .462                                            | .523                                      | .377    | .146    | 91.0                          | 101.9                                            | 82.7 | 19.2  |
| 27    | .425                                            | .473                                      | .348    | .125    | 91.2                          | 99.8                                             | 83.8 | 16.0  |
| 28    | <i>Sunday.</i>                                  |                                           |         |         |                               |                                                  |      |       |
| 29    | .466                                            | .536                                      | .395    | .141    | 90.8                          | 98.2                                             | 84.8 | 13.4  |
| 30    | .499                                            | .551                                      | .441    | .110    | 84.1                          | 90.2                                             | 81.5 | 8.7   |
| 31    | .503                                            | .551                                      | .452    | .099    | 82.9                          | 90.2                                             | 80.5 | 9.7   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of May, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|       | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| 1     | 80.5                            | 5.0                 | 78.0                | 7.5                          | .940                             | 10.03                                            | 2.69                                                                    | .0789                                                               |
| 2     | 75.1                            | 5.4                 | 72.4                | 8.1                          | .785                             | 8.46                                             | 2.52                                                                    | .770                                                                |
| 3     | 74.7                            | 4.2                 | 72.6                | 6.3                          | .790                             | 8.56                                             | 1.91                                                                    | .818                                                                |
| 4     | 76.1                            | 6.0                 | 73.1                | 9.0                          | .803                             | 8.63                                             | 2.88                                                                    | .750                                                                |
| 5     | 74.1                            | 6.3                 | 70.9                | 9.5                          | .748                             | 8.07                                             | 2.87                                                                    | .738                                                                |
| 6     | 76.5                            | 4.1                 | 74.4                | 6.2                          | .838                             | 9.04                                             | 1.97                                                                    | .821                                                                |
| 7     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 8     | 78.8                            | 4.4                 | 76.6                | 6.6                          | .899                             | 9.63                                             | 2.26                                                                    | .810                                                                |
| 9     | 78.5                            | 4.1                 | 76.4                | 6.2                          | .893                             | 9.60                                             | 2.08                                                                    | .822                                                                |
| 10    | 81.4                            | 3.5                 | 79.6                | 5.3                          | .989                             | 10.58                                            | 1.91                                                                    | .847                                                                |
| 11    | 81.5                            | 5.4                 | 78.8                | 8.1                          | .964                             | 10.27                                            | 2.98                                                                    | .775                                                                |
| 12    | 82.4                            | 5.6                 | 79.6                | 8.4                          | .989                             | 10.52                                            | 3.16                                                                    | .769                                                                |
| 13    | 82.7                            | 4.5                 | 80.4                | 6.8                          | 1.014                            | 10.79                                            | 2.58                                                                    | .807                                                                |
| 14    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 15    | 79.9                            | 6.7                 | 76.5                | 10.1                         | .896                             | 9.56                                             | 3.58                                                                    | .728                                                                |
| 16    | 81.6                            | 5.3                 | 78.9                | 8.0                          | .967                             | 10.30                                            | 2.95                                                                    | .777                                                                |
| 17    | 82.1                            | 5.0                 | 79.6                | 7.5                          | .989                             | 10.52                                            | 2.81                                                                    | .789                                                                |
| 18    | 82.4                            | 5.4                 | 79.7                | 8.1                          | .992                             | 10.55                                            | 3.05                                                                    | .776                                                                |
| 19    | 82.4                            | 6.2                 | 79.3                | 9.3                          | .979                             | 10.40                                            | 3.52                                                                    | .747                                                                |
| 20    | 82.7                            | 7.2                 | 79.1                | 10.8                         | .973                             | 10.30                                            | 4.16                                                                    | .712                                                                |
| 21    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 22    | 81.4                            | 8.8                 | 77.0                | 13.2                         | .910                             | 9.63                                             | 4.96                                                                    | .660                                                                |
| 23    | 81.7                            | 8.1                 | 77.6                | 12.2                         | .928                             | 9.83                                             | 4.59                                                                    | .682                                                                |
| 24    | 82.4                            | 7.1                 | 78.8                | 10.7                         | .964                             | 10.21                                            | 4.08                                                                    | .714                                                                |
| 25    | 82.8                            | 7.5                 | 79.0                | 11.3                         | .970                             | 10.27                                            | 4.36                                                                    | .702                                                                |
| 26    | 84.0                            | 7.0                 | 80.5                | 10.5                         | 1.017                            | 10.74                                            | 4.19                                                                    | .719                                                                |
| 27    | 84.2                            | 7.0                 | 80.7                | 10.5                         | .024                             | 10.80                                            | 4.22                                                                    | .719                                                                |
| 28    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                  |                                                                         |                                                                     |
| 29    | 84.6                            | 6.2                 | 81.5                | 9.3                          | .050                             | 11.11                                            | 3.73                                                                    | .749                                                                |
| 30    | 81.1                            | 3.0                 | 79.6                | 4.5                          | .089                             | 10.58                                            | 1.63                                                                    | .867                                                                |
| 31    | 81.0                            | 1.9                 | 80.0                | 2.9                          | 1.001                            | 10.75                                            | 1.04                                                                    | .912                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of May, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 29.699                                    | 29.903                                                 | 29.442  | 0.461   | 81.2                       | 87.2                                                     | 71.6 | 15.6  |
| 1          | .687                                      | .876                                                   | .444    | .432    | 81.0                       | 86.8                                                     | 71.2 | 15.6  |
| 2          | .674                                      | .874                                                   | .433    | .441    | 80.6                       | 86.6                                                     | 71.2 | 15.4  |
| 3          | .673                                      | .858                                                   | .437    | .421    | 80.3                       | 86.6                                                     | 70.9 | 15.7  |
| 4          | .679                                      | .863                                                   | .437    | .426    | 80.2                       | 85.4                                                     | 70.8 | 14.6  |
| 5          | .689                                      | .877                                                   | .430    | .447    | 79.9                       | 84.8                                                     | 71.3 | 13.5  |
| 6          | .720                                      | .911                                                   | .478    | .433    | 80.2                       | 84.8                                                     | 71.5 | 13.3  |
| 7          | .733                                      | .931                                                   | .455    | .476    | 81.4                       | 86.6                                                     | 71.5 | 15.1  |
| 8          | .751                                      | .957                                                   | .461    | .496    | 84.2                       | 89.0                                                     | 73.8 | 15.2  |
| 9          | .760                                      | .965                                                   | .473    | .492    | 87.1                       | 91.3                                                     | 77.2 | 14.1  |
| 10         | .764                                      | .975                                                   | .461    | .514    | 89.5                       | 94.0                                                     | 80.1 | 13.9  |
| 11         | .746                                      | .947                                                   | .458    | .489    | 91.2                       | 96.9                                                     | 82.4 | 14.5  |
| Noon.      | .730                                      | .939                                                   | .453    | .486    | 92.6                       | 99.0                                                     | 82.4 | 16.6  |
| 1          | .705                                      | .910                                                   | .426    | .484    | 93.5                       | 100.2                                                    | 80.5 | 19.7  |
| 2          | .675                                      | .867                                                   | .403    | .464    | 94.0                       | 101.5                                                    | 82.0 | 19.5  |
| 3          | .652                                      | .837                                                   | .381    | .456    | 94.4                       | 101.9                                                    | 81.2 | 20.7  |
| 4          | .621                                      | .794                                                   | .357    | .437    | 93.8                       | 101.8                                                    | 81.4 | 20.4  |
| 5          | .613                                      | .780                                                   | .348    | .432    | 92.6                       | 99.8                                                     | 81.6 | 18.2  |
| 6          | .622                                      | .790                                                   | .352    | .438    | 89.8                       | 97.0                                                     | 77.6 | 19.4  |
| 7          | .641                                      | .805                                                   | .372    | .433    | 87.2                       | 93.9                                                     | 73.6 | 20.3  |
| 8          | .675                                      | .944                                                   | .423    | .521    | 84.9                       | 90.5                                                     | 70.0 | 20.5  |
| 9          | .702                                      | .975                                                   | .427    | .548    | 83.3                       | 88.9                                                     | 71.7 | 17.2  |
| 10         | .708                                      | .927                                                   | .438    | .489    | 82.6                       | 87.4                                                     | 70.7 | 16.7  |
| 11         | .706                                      | .930                                                   | .447    | .483    | 82.2                       | 87.2                                                     | 72.1 | 15.1  |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of May, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|                | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| Mid-<br>night. | 78.4                            | 2.8                 | 77.0                | 4.2                          | 0.910                            | 9.81                                             | 1.40                                                                    | 0.875                                                               |
| 1              | 78.3                            | 2.7                 | 76.9                | 4.1                          | .908                             | .78                                              | .36                                                                     | .878                                                                |
| 2              | 78.1                            | 2.5                 | 76.8                | 3.8                          | .905                             | .75                                              | .26                                                                     | .886                                                                |
| 3              | 78.1                            | 2.2                 | 77.0                | 3.3                          | .910                             | .83                                              | .08                                                                     | .901                                                                |
| 4              | 78.2                            | 2.0                 | 77.2                | 3.0                          | .916                             | .89                                              | 0.99                                                                    | .909                                                                |
| 5              | 78.1                            | 1.8                 | 77.2                | 2.7                          | .916                             | .89                                              | .89                                                                     | .917                                                                |
| 6              | 78.5                            | 1.7                 | 77.6                | 2.6                          | .928                             | 10.01                                            | .87                                                                     | .920                                                                |
| 7              | 79.1                            | 2.3                 | 77.9                | 3.5                          | .937                             | .08                                              | 1.19                                                                    | .894                                                                |
| 8              | 80.4                            | 3.8                 | 78.5                | 5.7                          | .955                             | .23                                              | 2.01                                                                    | .836                                                                |
| 9              | 81.5                            | 5.6                 | 78.7                | 8.4                          | .961                             | .24                                              | 3.09                                                                    | .768                                                                |
| 10             | 82.5                            | 7.0                 | 79.0                | 10.5                         | .970                             | .27                                              | 4.02                                                                    | .719                                                                |
| 11             | 83.0                            | 8.2                 | 78.9                | 12.3                         | .967                             | .22                                              | .80                                                                     | .680                                                                |
| Noon.          | 83.5                            | 9.1                 | 78.9                | 13.7                         | .967                             | .18                                              | 5.45                                                                    | .651                                                                |
| 1              | 83.4                            | 10.1                | 78.3                | 15.2                         | .949                             | 9.97                                             | 6.07                                                                    | .622                                                                |
| 2              | 84.6                            | 10.4                | 78.4                | 15.6                         | .952                             | .98                                              | .29                                                                     | .613                                                                |
| 3              | 82.9                            | 11.5                | 77.1                | 17.3                         | .913                             | .58                                              | .88                                                                     | .582                                                                |
| 4              | 83.1                            | 10.7                | 77.7                | 16.1                         | .931                             | .78                                              | .40                                                                     | .604                                                                |
| 5              | 82.7                            | 9.9                 | 77.7                | 14.9                         | .931                             | .80                                              | 5.83                                                                    | .627                                                                |
| 6              | 82.0                            | 7.8                 | 78.1                | 11.7                         | .943                             | .97                                              | 4.45                                                                    | .691                                                                |
| 7              | 80.9                            | 6.3                 | 77.7                | 9.5                          | .931                             | .90                                              | 3.47                                                                    | .741                                                                |
| 8              | 80.0                            | 4.9                 | 77.5                | 7.4                          | .925                             | .90                                              | 2.59                                                                    | .793                                                                |
| 9              | 79.6                            | 3.7                 | 77.7                | 5.6                          | .931                             | .98                                              | 1.95                                                                    | .837                                                                |
| 10             | 79.4                            | 3.2                 | 77.8                | 4.8                          | .934                             | 10.03                                            | .65                                                                     | .859                                                                |
| 11             | 79.2                            | 3.0                 | 77.7                | 4.5                          | .931                             | 10.00                                            | .54                                                                     | .867                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of May, 1854.*

Solar radiation. Weather, &c.

| Date. | Max. Solar radiation. | Rain.      | Prevailing direction of the Wind. | General aspect of the Sky.                                                                                                        |
|-------|-----------------------|------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| 1     | o<br>131.8            | Inc.<br>.. | S. occasionally high.             | Cloudy till 2 A. M. cloudy till 6 A. M. scattered $\nabla$ till 11 A. M. cloudy afterwards.                                       |
| 2     | 133.9                 | ..         | S. (sharp.) or S. E.              | Cloudy the whole day with occasional lightning and thundering, also raining at 8 and 9 P. M.                                      |
| 3     | 124.0                 | 0.66       | N. E. or S. (stormy)              | Cloudless till 8 A. M. cloudy afterwards with rain between 9 and 10 P. M.                                                         |
| 4     | 125.2                 | ..         | S.                                | Scattered clouds of various kinds till 5 P. M. cloudless afterwards.                                                              |
| 5     | 146.0                 | ..         | S. or S. E. or N. (high)          | Overcast till 7 A. M. scattered $\nabla$ or $\nabla$ till 4 P. M. cloudy afterwards with rain and lightning at 7 and 8 P. M.      |
| 6     | 126.0                 | 1.06       | S. E. (sharp) or N. E. [or S.]    | Cloudless till 8 A. M. scattered $\nabla$ or $\nabla$ or $\nabla$ afterwards.                                                     |
| 7     | Sunday.               |            |                                   |                                                                                                                                   |
| 8     | 146.0                 | ..         | S.                                | Cloudless till 7 A. M. scattered $\nabla$ till 5 P. M. overcast afterwards with rain and lightning at 8 P. M.                     |
| 9     | 140.5                 | 0.52       | S.                                | Cloudless till 8 A. M. scattered $\nabla$ till 4 P. M. overcast afterwards with thunder, lightning and rain between 7 and 9 P. M. |
| 10    | 145.0                 | 0.57       | S.                                | Cloudy the whole day, also drizzling at 10 P. M.                                                                                  |
| 11    | 150.0                 | ..         | S. or W.                          | Overcast till 1 A. M. cloudless till 5 A. M. scattered $\nabla$ and $\nabla$ till 1 P. M. cloudless afterwards.                   |
| 12    | 136.0                 | ..         | S.                                | Cloudy till 3 A. M. cloudless till 8 P. M. overcast afterwards.                                                                   |
| 13    | 149.4                 | ..         | S.                                | Cloudy till 1 A. M. cloudless till 8 P. M. cloudy afterwards.                                                                     |
| 14    | Sunday                |            |                                   |                                                                                                                                   |
| 15    | 141.0                 | ..         | E. or S. E. or S.                 | Cloudy till 2 A. M. scattered $\nabla$ till 1 P. M. cloudless till 5 P. M. scattered $\nabla$ afterwards.                         |
| 16    | 138.7                 | ..         | S. E. or S. or N. E.              | Cloudy nearly the whole day, also drizzling at 11 A. M.                                                                           |
| 17    | 140.0                 | ..         | S.                                | Scattered $\nabla$ or $\nabla$ or $\nabla$ till 2 P. M. overcast afterwards.                                                      |
| 18    | 131.0                 | ..         | S.                                | Cloudy till 8 A. M. cloudless afterwards.                                                                                         |
| 19    | 139.0                 | ..         | S. E. or S.                       | Cloudless till 2 A. M. cloudy afterwards.                                                                                         |
| 20    | 150.0                 | ..         | S.                                | Cloudless.                                                                                                                        |

| Date. | Max Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                                                                                                                                         |
|-------|----------------------|-------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 21    | o                    | Inc.  |                                   |                                                                                                                                                                    |
| 22    | Sunday.              |       |                                   |                                                                                                                                                                    |
| 23    | 156.0                | ..    | S.                                | Cloudless.                                                                                                                                                         |
| 24    | 157.0                | ..    | S.                                | Cloudless.                                                                                                                                                         |
| 25    | 156.0                | ..    | S.                                | Cloudless.                                                                                                                                                         |
| 26    | 152.2                | ..    | S. or S. E.                       | Cloudless.                                                                                                                                                         |
| 27    | 158.0                | ..    | S. or S. E.                       | Cloudless.                                                                                                                                                         |
| 28    | 143.6                | ..    | S. E. or E.                       | Cloudless till 10 A. M. scattered $\searrow$ till 3 P. M. cloudless afterwards.                                                                                    |
| 29    | Sunday.              |       |                                   |                                                                                                                                                                    |
| 30    | 157.0                | ..    | S. or E. or N. E.                 | Cloudless till 6 A. M. scattered $\searrow$ i till noon, scattered $\searrow$ i till 6 P. M. cloudless till 9 P. M. clouds and lightning on w. horizon afterwards. |
| 31    | ....                 | 0.38  | E. or S. E.                       | Cloudy till 1 A. M. cloudless till 5 A. M. cloudy afterwards, also raining at 11 A. M.                                                                             |
|       | 134.0                | 0.56  | E. or N. E. or S.                 | Cloudy also raining between 11 A. M. and 7 P. M.                                                                                                                   |

$\searrow$  i Cirri  $\searrow$  i cumuli, — i strati,  $\searrow$  i cirro-cumuli  $\searrow$  i cirro-strati  $\searrow$  i cumulo-strati  
 $\searrow$  i nimbi,

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of June, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |         |        | Mean Dry Bulb<br>Thermometer. | Range of the Tempe-<br>rature during<br>the day. |      |       |
|-------|-------------------------------------------------|-------------------------------------------|---------|--------|-------------------------------|--------------------------------------------------|------|-------|
|       |                                                 | Max.                                      | Min.    | Diff.  |                               | Max.                                             | Min. | Diff. |
|       | Inches.                                         | Inches.                                   | Inches. | Inches | °                             | °                                                | °    | °     |
| 1     | 29.488                                          | 29.533                                    | 29.444  | 0.094  | 82.2                          | 88.2                                             | 80.0 | 8.2   |
| 2     | .450                                            | .509                                      | .387    | .122   | 80.4                          | 85.9                                             | 77.0 | 8.9   |
| 3     | .457                                            | .518                                      | .411    | .107   | 79.3                          | 80.5                                             | 78.4 | 2.1   |
| 4     | Sunday.                                         |                                           |         |        |                               |                                                  |      |       |
| 5     | .520                                            | .587                                      | .470    | .117   | 82.6                          | 89.4                                             | 75.0 | 14.4  |
| 6     | .511                                            | .592                                      | .393    | .189   | 84.3                          | 90.6                                             | 79.0 | 11.6  |
| 7     | .463                                            | .530                                      | .398    | .132   | 88.4                          | 94.8                                             | 83.2 | 11.6  |
| 8     | .498                                            | .565                                      | .448    | .117   | 87.4                          | 91.4                                             | 84.6 | 6.8   |
| 9     | .555                                            | .640                                      | .506    | .134   | 87.4                          | 95.2                                             | 81.2 | 14.0  |
| 10    | .579                                            | .633                                      | .494    | .139   | 86.1                          | 93.6                                             | 80.0 | 13.6  |
| 11    | Sunday.                                         |                                           |         |        |                               |                                                  |      |       |
| 12    | .430                                            | .484                                      | .377    | .107   | 86.3                          | 91.8                                             | 83.0 | 8.8   |
| 13    | .412                                            | .475                                      | .350    | .125   | 81.5                          | 84.2                                             | 79.0 | 5.2   |
| 14    | .472                                            | .534                                      | .424    | .110   | 85.9                          | 92.2                                             | 79.5 | 12.7  |
| 15    | .530                                            | .570                                      | .480    | .090   | 87.4                          | 93.2                                             | 79.8 | 13.4  |
| 16    | .546                                            | .585                                      | .483    | .102   | 84.0                          | 90.9                                             | 79.0 | 11.9  |
| 17    | .546                                            | .594                                      | .491    | .103   | 83.5                          | 90.1                                             | 78.8 | 11.3  |
| 18    | Sunday.                                         |                                           |         |        |                               |                                                  |      |       |
| 19    | .515                                            | .556                                      | .473    | .083   | 82.0                          | 85.0                                             | 80.0 | 5.0   |
| 20    | .571                                            | .640                                      | .523    | .117   | 81.0                          | 83.2                                             | 78.2 | 5.0   |
| 21    | .607                                            | .661                                      | .550    | .111   | 83.8                          | 88.7                                             | 80.5 | 8.2   |
| 22    | .583                                            | .624                                      | .526    | .098   | 85.8                          | 90.6                                             | 80.4 | 10.2  |
| 23    | .583                                            | .638                                      | .507    | .131   | 85.7                          | 90.6                                             | 83.0 | 7.6   |
| 24    | .583                                            | .618                                      | .535    | .083   | 84.6                          | 86.8                                             | 81.8 | 5.0   |
| 25    | Sunday.                                         |                                           |         |        |                               |                                                  |      |       |
| 26    | .609                                            | .659                                      | .525    | .134   | 85.2                          | 91.6                                             | 81.2 | 10.4  |
| 27    | .619                                            | .681                                      | .573    | .108   | 83.0                          | 88.2                                             | 81.3 | 6.9   |
| 28    | .711                                            | .765                                      | .669    | .096   | 79.8                          | 82.4                                             | 78.0 | 4.4   |
| 29    | .711                                            | .755                                      | .640    | .115   | 84.1                          | 90.0                                             | 79.6 | 10.4  |
| 30    | .658                                            | .716                                      | .579    | .137   | 85.2                          | 89.8                                             | 81.6 | 8.2   |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of June, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Va-<br>pour in a cubic<br>foot of air. | Additional weight of<br>Vapour required for<br>complete saturation. | Mean degree of Hu-<br>midity, complete sa-<br>turation being unity. |
|-------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
|       | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                                | T. gr.                                                              |                                                                     |
| 1     | 80.4                            | 1.8                 | 79.5                | 2.7                          | 0.986                            | 10.60                                                 | 0.94                                                                | 0.919                                                               |
| 2     | 79.0                            | 1.4                 | 78.3                | 2.1                          | .949                             | 10.24                                                 | 0.70                                                                | .936                                                                |
| 3     | 78.3                            | 1.0                 | 77.8                | 1.5                          | .934                             | 10.09                                                 | 0.50                                                                | .953                                                                |
| 4     | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                     |
| 5     | 80.4                            | 2.2                 | 79.3                | 3.3                          | .979                             | 10.53                                                 | 1.15                                                                | .902                                                                |
| 6     | 82.0                            | 2.3                 | 80.8                | 3.5                          | 1.027                            | 10.98                                                 | 1.30                                                                | .894                                                                |
| 7     | 85.1                            | 3.3                 | 83.4                | 5.0                          | .114                             | 11.84                                                 | 2.00                                                                | .855                                                                |
| 8     | 83.9                            | 3.5                 | 82.1                | 5.3                          | .069                             | 11.39                                                 | 2.06                                                                | .847                                                                |
| 9     | 83.9                            | 3.5                 | 82.1                | 5.3                          | .069                             | 11.39                                                 | 2.06                                                                | .847                                                                |
| 10    | 82.5                            | 3.6                 | 80.7                | 5.4                          | .024                             | 10.93                                                 | 2.02                                                                | .844                                                                |
| 11    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                     |
| 12    | 82.8                            | 3.5                 | 81.0                | 5.3                          | .034                             | 11.03                                                 | 1.99                                                                | .847                                                                |
| 13    | 80.0                            | 1.5                 | 79.2                | 2.3                          | 0.976                            | 10.52                                                 | 0.79                                                                | .930                                                                |
| 14    | 82.4                            | 3.5                 | 80.6                | 5.3                          | 1.021                            | 10.90                                                 | 1.97                                                                | .847                                                                |
| 15    | 83.6                            | 3.8                 | 81.7                | 5.7                          | .057                             | 11.23                                                 | 2.22                                                                | .835                                                                |
| 16    | 81.2                            | 2.8                 | 79.8                | 4.2                          | 0.995                            | 10.66                                                 | 1.51                                                                | .876                                                                |
| 17    | 80.5                            | 3.0                 | 79.0                | 4.5                          | .970                             | 10.40                                                 | 1.60                                                                | .867                                                                |
| 18    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                     |
| 19    | 80.2                            | 1.8                 | 79.3                | 2.7                          | .979                             | 10.53                                                 | 0.94                                                                | .918                                                                |
| 20    | 79.4                            | 1.6                 | 78.6                | 2.4                          | .958                             | 10.34                                                 | 0.80                                                                | .928                                                                |
| 21    | 81.6                            | 2.2                 | 80.5                | 3.3                          | 1.017                            | 10.91                                                 | 1.19                                                                | .902                                                                |
| 22    | 82.5                            | 3.3                 | 80.8                | 5.0                          | .027                             | 10.96                                                 | 1.87                                                                | .854                                                                |
| 23    | 82.6                            | 3.1                 | 81.0                | 4.7                          | .034                             | 11.03                                                 | 1.77                                                                | .862                                                                |
| 24    | 82.0                            | 2.6                 | 80.7                | 3.9                          | .024                             | 10.95                                                 | 1.44                                                                | .884                                                                |
| 25    | <i>Sunday.</i>                  |                     |                     |                              |                                  |                                                       |                                                                     |                                                                     |
| 26    | 82.2                            | 3.0                 | 80.7                | 4.5                          | .024                             | 10.93                                                 | 1.68                                                                | .867                                                                |
| 27    | 80.9                            | 2.1                 | 79.8                | 3.2                          | 0.995                            | 10.69                                                 | 1.13                                                                | .904                                                                |
| 28    | 78.3                            | 1.5                 | 77.5                | 2.3                          | .925                             | 10.00                                                 | 0.75                                                                | .930                                                                |
| 29    | 80.8                            | 3.3                 | 79.1                | 5.0                          | .973                             | 10.42                                                 | 1.79                                                                | .853                                                                |
| 30    | 81.8                            | 3.4                 | 80.1                | 5.1                          | 1.005                            | 10.73                                                 | 1.88                                                                | .851                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of June, 1854.*

Hourly Means, &c., of the observations and of the hygrometrical elements  
dependent thereon, (Continued.)

| Hour.          | Mean Height of the Baro-<br>meter at 32° Fahr. | Range of the Barometer for<br>each hour during<br>the month. |         |         | Mean Dry Bulb Thermo-<br>meter. | Range of the Temperature<br>for each hour during<br>the month. |      |       |
|----------------|------------------------------------------------|--------------------------------------------------------------|---------|---------|---------------------------------|----------------------------------------------------------------|------|-------|
|                |                                                | Max.                                                         | Min.    | Diff.   |                                 | Max.                                                           | Min. | Diff. |
|                | Inches.                                        | Inches.                                                      | Inches. | Inches. | °                               | °                                                              | °    | °     |
| Mid-<br>night. | 29.561                                         | 29.741                                                       | 29.428  | 0.313   | 81.9                            | 86.6                                                           | 75.0 | 11.6  |
| 1              | .550                                           | .753                                                         | .407    | .346    | 81.8                            | 86.4                                                           | 75.0 | 11.4  |
| 2              | .538                                           | .743                                                         | .386    | .357    | 81.8                            | 85.7                                                           | 75.2 | 10.5  |
| 3              | .528                                           | .734                                                         | .354    | .380    | 81.5                            | 85.4                                                           | 76.4 | 9.0   |
| 4              | .525                                           | .732                                                         | .354    | .378    | 81.5                            | 85.4                                                           | 78.2 | 7.2   |
| 5              | .532                                           | .721                                                         | .350    | .371    | 81.4                            | 85.4                                                           | 78.2 | 7.2   |
| 6              | .546                                           | .743                                                         | .359    | .384    | 81.4                            | 85.0                                                           | 78.3 | 6.7   |
| 7              | .562                                           | .751                                                         | .398    | .353    | 82.1                            | 85.6                                                           | 78.4 | 7.2   |
| 8              | .578                                           | .755                                                         | .440    | .315    | 83.4                            | 87.4                                                           | 78.6 | 8.8   |
| 9              | .585                                           | .760                                                         | .444    | .316    | 84.7                            | 90.0                                                           | 79.6 | 10.4  |
| 10             | .586                                           | .765                                                         | .441    | .324    | 85.9                            | 91.6                                                           | 79.3 | 12.3  |
| 11             | .580                                           | .758                                                         | .442    | .316    | 87.0                            | 93.1                                                           | 79.8 | 13.3  |
| Noon.          | .569                                           | .746                                                         | .448    | .298    | 88.0                            | 93.4                                                           | 80.1 | 13.3  |
| 1              | .553                                           | .741                                                         | .423    | .318    | 88.2                            | 94.2                                                           | 79.0 | 15.2  |
| 2              | .531                                           | .723                                                         | .409    | .314    | 88.3                            | 95.2                                                           | 78.8 | 16.4  |
| 3              | .510                                           | .698                                                         | .387    | .311    | 88.0                            | 95.2                                                           | 79.4 | 15.8  |
| 4              | .494                                           | .676                                                         | .374    | .302    | 86.8                            | 94.2                                                           | 77.0 | 17.2  |
| 5              | .495                                           | .678                                                         | .361    | .317    | 86.3                            | 94.8                                                           | 78.0 | 16.8  |
| 6              | .504                                           | .696                                                         | .373    | .323    | 84.7                            | 92.4                                                           | 78.0 | 14.4  |
| 7              | .523                                           | .694                                                         | .391    | .303    | 83.7                            | 91.2                                                           | 78.6 | 12.6  |
| 8              | .542                                           | .704                                                         | .399    | .305    | 83.3                            | 89.6                                                           | 78.7 | 10.9  |
| 9              | .564                                           | .710                                                         | .418    | .292    | 82.5                            | 88.3                                                           | 78.8 | 9.5   |
| 10             | .579                                           | .718                                                         | .442    | .276    | 82.3                            | 87.7                                                           | 78.7 | 9.0   |
| 11             | .579                                           | .741                                                         | .443    | .298    | 82.1                            | 86.8                                                           | 78.8 | 8.0   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of June, 1854.*

Hourly Means, &c., of the observations and of the hygrometrical elements  
dependent thereon, (Continued.)

| Hour.          | Mean Wet Bulb Thermo-<br>meter. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|                | °                               | °                   | °                   | °                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| Mid-<br>night. | 80.3                            | 1.6                 | 79.5                | 2.4                          | 0.986                            | 10.62                                            | 0.82                                                                    | 0.928                                                               |
| 1              | 80.3                            | 1.5                 | 79.5                | 2.3                          | .986                             | .62                                              | .78                                                                     | .932                                                                |
| 2              | 80.3                            | 1.5                 | 79.5                | 2.3                          | .986                             | .62                                              | .78                                                                     | .932                                                                |
| 3              | 80.2                            | 1.3                 | 79.5                | 2.0                          | .986                             | .62                                              | .69                                                                     | .939                                                                |
| 4              | 80.2                            | 1.3                 | 79.5                | 2.0                          | .986                             | .62                                              | .69                                                                     | .939                                                                |
| 5              | 80.1                            | 1.3                 | 79.4                | 2.0                          | .983                             | .58                                              | .69                                                                     | .939                                                                |
| 6              | 80.2                            | 1.2                 | 79.6                | 1.8                          | .989                             | .65                                              | .62                                                                     | .945                                                                |
| 7              | 80.7                            | 1.4                 | 80.0                | 2.1                          | 1.001                            | .77                                              | .74                                                                     | .936                                                                |
| 8              | 81.2                            | 2.2                 | 80.1                | 3.3                          | .005                             | .77                                              | 1.19                                                                    | .901                                                                |
| 9              | 81.8                            | 2.9                 | 80.3                | 4.4                          | .011                             | .82                                              | .60                                                                     | .871                                                                |
| 10             | 82.6                            | 3.3                 | 80.9                | 5.0                          | .030                             | .99                                              | .88                                                                     | .854                                                                |
| 11             | 83.0                            | 4.0                 | 81.0                | 6.0                          | .034                             | 11.01                                            | 2.28                                                                    | .828                                                                |
| Noon.          | 83.5                            | 4.5                 | 81.2                | 6.8                          | .040                             | .05                                              | .63                                                                     | .808                                                                |
| 1              | 83.5                            | 4.7                 | 81.1                | 7.1                          | .037                             | .01                                              | .75                                                                     | .800                                                                |
| 2              | 83.5                            | 4.8                 | 81.1                | 7.2                          | .037                             | .01                                              | .79                                                                     | .798                                                                |
| 3              | 83.6                            | 4.4                 | 81.4                | 6.6                          | .047                             | .11                                              | .57                                                                     | .812                                                                |
| 4              | 82.9                            | 3.9                 | 80.9                | 5.9                          | .030                             | 10.97                                            | .24                                                                     | .830                                                                |
| 5              | 82.4                            | 3.9                 | 80.4                | 5.9                          | .014                             | .81                                              | .21                                                                     | .830                                                                |
| 6              | 81.5                            | 3.2                 | 79.9                | 4.8                          | 0.998                            | .67                                              | 1.75                                                                    | .859                                                                |
| 7              | 81.0                            | 2.7                 | 79.6                | 4.1                          | .989                             | .60                                              | .47                                                                     | .878                                                                |
| 8              | 80.9                            | 2.4                 | 79.7                | 3.6                          | .992                             | .63                                              | .30                                                                     | .891                                                                |
| 9              | 80.6                            | 1.9                 | 79.6                | 2.9                          | .989                             | .63                                              | .10                                                                     | .913                                                                |
| 10             | 80.5                            | 1.8                 | 79.6                | 2.7                          | .989                             | .63                                              | 0.95                                                                    | .918                                                                |
| 11             | 80.4                            | 1.7                 | 79.5                | 2.6                          | .986                             | .60                                              | .91                                                                     | .921                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
Month of June, 1854.*

Solar radiation, Weather, &c.

| Date. | Max. Solar radiation. | Rain. | Prevailing direction of the Wind. | General aspect of the Sky.                                          |
|-------|-----------------------|-------|-----------------------------------|---------------------------------------------------------------------|
| 1     | o                     | Inc   |                                   |                                                                     |
| 2     | ..                    | ..    | N. E. or N.N.E. or S.W.           | Cloudy and raining occasionally.                                    |
| 3     | ..                    | 1.92  | Calm or S. E. or S. W.            | Ditto ditto ditto.                                                  |
| 4     | ..                    | 3.66  | Calm or S. W. or W.               | Cloudy and raining constantly.                                      |
| 5     | Sunday.               | 3 32  | .....                             |                                                                     |
| 6     | ..                    | ..    | S. E. or E. or S. or N.           | Cloudy and occasional rain with thunder and lightning.              |
| 7     | ..                    | 0.36  | S. or W.                          | Ditto ditto ditto.                                                  |
| 8     | 142.0                 | 0.16  | Calm or S. or S. W.               | Cloudy.                                                             |
| 9     | 125.0                 | ..    | Calm or S. or S. E.               | Overcast.                                                           |
| 10    | 139.0                 | ..    | Calm or S. E. or S.               | Cloudy and rain between 5 and 6 P. M.                               |
| 11    | 137.0                 | 0.65  | S. E. or S.                       | Cloudy.                                                             |
| 12    | Sunday.               | ..    | .....                             |                                                                     |
| 13    | 121.0                 | ..    | S.                                | Overcast and Drizzling at 7 P. M.                                   |
| 14    | ..                    | 2.13  | N. W.                             | Overcast and raining occasionally.                                  |
| 15    | 139.0                 | ..    | S. or S. W. or W.                 | Overcast.                                                           |
| 16    | 117.0                 | ..    | Calm or W. or S. W.               | Cloudy with rain between 8 and 9 P. M.                              |
| 17    | 133.0                 | 0.12  | S. E. or S.                       | Overcast and raining from 7 P. M. till midnight.                    |
| 18    | 142.5                 | 1.16  | S.                                | Cloudy and Drizzling at 3 A. M. 9 and 10 P. M.                      |
| 19    | Sunday                | ..    | .....                             |                                                                     |
| 20    | ..                    | 0.60  | E. or S. E. or S.                 | Cloudy and raining or Drizzling constantly.                         |
| 21    | ..                    | 0.46  | S. E.                             | Ditto ditto ditto.                                                  |
| 22    | ..                    | ..    | S. E. or S. W. or S.S.E.          | Cloudless till 2 A. M. overcast afterwards.                         |
| 23    | 136.5                 | ..    | S. E. occasionally sharp.         | Cloudy.                                                             |
| 24    | 118.0                 | ..    | S. sharp or E.                    | Ditto.                                                              |
| 25    | ..                    | ..    | S. E. sharp in the M.             | Overcast and Drizzling at 2 A. M.                                   |
| 26    | Sunday.               | 0.42  | ....                              |                                                                     |
| 27    | 147.0                 | ..    | S. or N. E. or S.                 | Cloudless till 5 A. M. afterwards cloudy with occasional Drizzling. |
| 28    | 119.0                 | 0.88  | S. or calm or S. E.               | Cloudy and raining between 3 P. M. and midnight.                    |
| 29    | ..                    | 0.78  | S.                                | Cloudy and constantly raining or Drizzling.                         |
| 30    | 148 0                 | 0.20  | S. E. or S.                       | Cloudy with little Drizzling.                                       |
| 31    | 138.0                 | ..    | S. E. or S.                       | Cloudless till 3 A. M. cloudy and little Drizzling at 10 P. M.      |

^i Cirri ^ cirro-strati, ^i cumuli, ^i cumulo-strati, ^i nimbi, —i strati, ^i cirro-cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of July, 1854.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon.

| Date. | Mean Height of<br>the Barometer<br>at 32° Fahr. | Range of the Barometer<br>during the day. |                   |                  | Mean Dry Bulb<br>Thermometer. | Range of the Tempera-<br>ture during the day. |           |          |
|-------|-------------------------------------------------|-------------------------------------------|-------------------|------------------|-------------------------------|-----------------------------------------------|-----------|----------|
|       |                                                 | Max.                                      | Min.              | Diff.            |                               | Max.                                          | Min.      | Diff.    |
| 1     | Inches.<br>29.619                               | Inches.<br>29.663                         | Inches.<br>29.543 | Inches.<br>0.120 | o<br>85.1                     | o<br>90.0                                     | o<br>82.7 | o<br>7.3 |
| 2     | <i>Sunday.</i>                                  |                                           |                   |                  |                               |                                               |           |          |
| 3     | .608                                            | .655                                      | .544              | .111             | 85.5                          | 90.2                                          | 81.4      | 8.8      |
| 4     | .629                                            | .671                                      | .580              | .091             | 82.8                          | 86.6                                          | 80.8      | 5.8      |
| 5     | .595                                            | .645                                      | .531              | .114             | 84.0                          | 89.8                                          | 79.8      | 10.0     |
| 6     | .530                                            | .569                                      | .463              | .106             | 84.8                          | 91.0                                          | 81.5      | 9.5      |
| 7     | .508                                            | .545                                      | .453              | .092             | 85.7                          | 90.4                                          | 82.7      | 7.7      |
| 8     | .524                                            | .558                                      | .486              | .072             | 83.7                          | 84.6                                          | 81.7      | 2.9      |
| 9     | <i>Sunday.</i>                                  |                                           |                   |                  |                               |                                               |           |          |
| 10    | .577                                            | .610                                      | .516              | .094             | 83.0                          | 88.1                                          | 76.2      | 11.9     |
| 11    | .551                                            | .600                                      | .487              | .113             | 84.8                          | 90.3                                          | 81.3      | 9.0      |
| 12    | .535                                            | .581                                      | .478              | .103             | 83.8                          | 88.7                                          | 81.5      | 7.2      |
| 13    | .536                                            | .584                                      | .461              | .123             | 83.0                          | 88.8                                          | 80.1      | 8.7      |
| 14    | .570                                            | .613                                      | .518              | .095             | 82.6                          | 87.3                                          | 79.8      | 7.5      |
| 15    | .593                                            | .660                                      | .530              | .130             | 83.3                          | 89.0                                          | 80.0      | 9.0      |
| 16    | <i>Sunday.</i>                                  |                                           |                   |                  |                               |                                               |           |          |
| 17    | .448                                            | .509                                      | .352              | .157             | 84.9                          | 91.0                                          | 81.0      | 10.0     |
| 18    | .440                                            | .500                                      | .370              | .130             | 82.8                          | 87.2                                          | 81.0      | 6.2      |
| 19    | .500                                            | .576                                      | .442              | .134             | 82.9                          | 87.3                                          | 77.6      | 9.7      |
| 20    | .546                                            | .600                                      | .479              | .121             | 84.4                          | 89.5                                          | 80.6      | 8.9      |
| 21    | .582                                            | .654                                      | .503              | .151             | 84.2                          | 89.2                                          | 80.4      | 8.8      |
| 22    | .635                                            | .699                                      | .572              | .127             | 84.8                          | 91.6                                          | 80.6      | 11.0     |
| 23    | <i>Sunday.</i>                                  |                                           |                   |                  |                               |                                               |           |          |
| 24    | .595                                            | .649                                      | .523              | .126             | 84.2                          | 85.4                                          | 83.0      | 2.4      |
| 25    | .495                                            | .577                                      | .407              | .170             | 82.9                          | 87.6                                          | 80.5      | 7.1      |
| 26    | .494                                            | .554                                      | .450              | .104             | 80.2                          | 83.0                                          | 78.6      | 4.4      |
| 27    | .551                                            | .611                                      | .504              | .107             | 80.1                          | 82.8                                          | 78.8      | 4.0      |
| 28    | .593                                            | .647                                      | .545              | .102             | 83.3                          | 89.8                                          | 79.2      | 10.6     |
| 29    | .600                                            | .674                                      | .513              | .161             | 87.3                          | 93.6                                          | 82.1      | 11.5     |
| 30    | <i>Sunday.</i>                                  |                                           |                   |                  |                               |                                               |           |          |
| 31    | .452                                            | .517                                      | .359              | .158             | 83.7                          | 90.7                                          | 80.0      | 10.7     |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of July, 1854.*

Daily Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Date. | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dew<br>Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of lumi-<br>nity, complete satura-<br>tion being unity. |
|-------|---------------------------------|---------------------|---------------------|---------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
| 1     | 82.6                            | 2.5                 | 81.3                | 3.8                             | Inches.<br>1.043                 | T. gr.<br>11.15                                  | T. gr.<br>1.42                                                          | .887                                                                |
| 2     | Sunday.                         |                     |                     |                                 |                                  |                                                  |                                                                         |                                                                     |
| 3     | 82.0                            | 3.5                 | 80.2                | 5.3                             | 1.008                            | 10.77                                            | 1.95                                                                    | .847                                                                |
| 4     | 80.8                            | 2.0                 | 79.8                | 3.0                             | 0.995                            | 10.69                                            | 1.06                                                                    | .910                                                                |
| 5     | 81.0                            | 3.0                 | 79.5                | 4.5                             | 0.986                            | 10.55                                            | 1.62                                                                    | .867                                                                |
| 6     | 82.1                            | 2.7                 | 80.7                | 4.1                             | 1.024                            | 10.95                                            | 1.51                                                                    | .879                                                                |
| 7     | 82.6                            | 3.1                 | 81.0                | 4.7                             | 1.034                            | 11.03                                            | 1.77                                                                    | .862                                                                |
| 8     | 82.0                            | 1.7                 | 81.1                | 2.6                             | 1.037                            | 11.10                                            | 0.97                                                                    | .920                                                                |
| 9     | Sunday.                         |                     |                     |                                 |                                  |                                                  |                                                                         |                                                                     |
| 10    | 80.7                            | 2.3                 | 79.5                | 3.5                             | 0.986                            | 10.57                                            | 1.25                                                                    | .894                                                                |
| 11    | 82.1                            | 2.7                 | 80.7                | 4.1                             | 1.024                            | 10.95                                            | 1.51                                                                    | .879                                                                |
| 12    | 81.2                            | 2.6                 | 79.9                | 3.9                             | 0.998                            | 10.69                                            | 1.41                                                                    | .883                                                                |
| 13    | 80.6                            | 2.4                 | 79.4                | 3.6                             | 0.983                            | 10.54                                            | 1.28                                                                    | .892                                                                |
| 14    | 80.7                            | 1.9                 | 79.7                | 2.9                             | 0.992                            | 10.66                                            | 1.02                                                                    | .913                                                                |
| 15    | 81.2                            | 2.1                 | 80.1                | 3.2                             | 1.005                            | 10.77                                            | 1.16                                                                    | .903                                                                |
| 16    | Sunday.                         |                     |                     |                                 |                                  |                                                  |                                                                         |                                                                     |
| 17    | 81.4                            | 3.5                 | 79.6                | 5.3                             | 0.989                            | 10.58                                            | 1.91                                                                    | .847                                                                |
| 18    | 80.4                            | 2.4                 | 79.2                | 3.6                             | 0.976                            | 10.48                                            | 1.27                                                                    | .892                                                                |
| 19    | 80.3                            | 2.6                 | 79.0                | 3.9                             | 0.970                            | 10.42                                            | 1.37                                                                    | .884                                                                |
| 20    | 81.1                            | 3.3                 | 79.4                | 5.0                             | 0.983                            | 10.51                                            | 1.80                                                                    | .854                                                                |
| 21    | 81.4                            | 2.8                 | 80.0                | 4.2                             | 1.001                            | 10.72                                            | 1.52                                                                    | .876                                                                |
| 22    | 81.7                            | 3.1                 | 80.1                | 4.7                             | 1.005                            | 10.73                                            | 1.73                                                                    | .861                                                                |
| 23    | Sunday.                         |                     |                     |                                 |                                  |                                                  |                                                                         |                                                                     |
| 24    | 81.8                            | 2.4                 | 80.6                | 3.6                             | 1.021                            | 10.92                                            | 1.32                                                                    | .892                                                                |
| 25    | 80.7                            | 2.2                 | 79.6                | 3.3                             | 0.989                            | 10.63                                            | 1.16                                                                    | .902                                                                |
| 26    | 78.8                            | 1.4                 | 78.1                | 2.1                             | 0.943                            | 10.18                                            | 0.70                                                                    | .936                                                                |
| 27    | 78.8                            | 1.3                 | 78.1                | 2.0                             | 0.943                            | 10.18                                            | 0.66                                                                    | .939                                                                |
| 28    | 81.5                            | 1.8                 | 80.6                | 2.7                             | 1.021                            | 10.94                                            | 0.99                                                                    | .917                                                                |
| 29    | 84.2                            | 3.1                 | 82.6                | 4.7                             | 1.087                            | 11.56                                            | 1.85                                                                    | .862                                                                |
| 30    | Sunday.                         |                     |                     |                                 |                                  |                                                  |                                                                         |                                                                     |
| 31    | 81.1                            | 2.6                 | 79.8                | 3.9                             | 0.995                            | 10.66                                            | 1.41                                                                    | .883                                                                |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of July, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.      | Mean Height of the Barometer at 32° Fahr. | Range of the Barometer for each hour during the month. |         |         | Mean Dry Bulb Thermometer. | Range of the Temperature for each hour during the month. |      |       |
|------------|-------------------------------------------|--------------------------------------------------------|---------|---------|----------------------------|----------------------------------------------------------|------|-------|
|            |                                           | Max.                                                   | Min.    | Diff.   |                            | Max.                                                     | Min. | Diff. |
|            | Inches.                                   | Inches.                                                | Inches. | Inches. | °                          | °                                                        | °    | °     |
| Mid-night. | 29.572                                    | 29.645                                                 | 29.434  | 0.211   | 81.9                       | 84.2                                                     | 76.2 | 8.0   |
| 1          | .559                                      | .635                                                   | .410    | .225    | 81.7                       | 84.4                                                     | 77.0 | 7.4   |
| 2          | .547                                      | .625                                                   | .403    | .222    | 81.5                       | 84.2                                                     | 77.2 | 7.0   |
| 3          | .540                                      | .622                                                   | .406    | .216    | 81.3                       | 84.2                                                     | 77.6 | 6.6   |
| 4          | .537                                      | .617                                                   | .420    | .197    | 81.1                       | 83.9                                                     | 77.6 | 6.3   |
| 5          | .540                                      | .621                                                   | .425    | .196    | 80.8                       | 83.6                                                     | 77.6 | 6.0   |
| 6          | .553                                      | .639                                                   | .451    | .188    | 80.9                       | 83.6                                                     | 78.2 | 5.4   |
| 7          | .570                                      | .665                                                   | .466    | .199    | 81.7                       | 83.9                                                     | 79.2 | 4.7   |
| 8          | .588                                      | .693                                                   | .476    | .217    | 83.0                       | 85.6                                                     | 79.6 | 6.0   |
| 9          | .593                                      | .699                                                   | .483    | .216    | 84.6                       | 87.6                                                     | 80.2 | 7.4   |
| 10         | .592                                      | .696                                                   | .476    | .220    | 85.8                       | 88.8                                                     | 82.4 | 6.4   |
| 11         | .586                                      | .680                                                   | .476    | .204    | 86.7                       | 90.4                                                     | 79.8 | 10.6  |
| Noon.      | .571                                      | .662                                                   | .461    | .201    | 87.3                       | 91.4                                                     | 79.2 | 12.2  |
| 1          | .550                                      | .643                                                   | .431    | .212    | 87.2                       | 92.0                                                     | 81.2 | 10.8  |
| 2          | .528                                      | .622                                                   | .410    | .212    | 86.7                       | 92.6                                                     | 79.8 | 12.8  |
| 3          | .512                                      | .598                                                   | .372    | .226    | 86.6                       | 93.6                                                     | 79.4 | 14.2  |
| 4          | .495                                      | .580                                                   | .364    | .216    | 86.2                       | 92.4                                                     | 78.6 | 13.8  |
| 5          | .488                                      | .582                                                   | .352    | .230    | 85.3                       | 92.8                                                     | 79.8 | 13.0  |
| 6          | .501                                      | .587                                                   | .367    | .220    | 84.4                       | 92.0                                                     | 80.1 | 11.9  |
| 7          | .520                                      | .605                                                   | .397    | .208    | 83.9                       | 89.7                                                     | 79.7 | 10.0  |
| 8          | .543                                      | .621                                                   | .413    | .208    | 83.5                       | 88.8                                                     | 79.2 | 9.6   |
| 9          | .562                                      | .647                                                   | .447    | .200    | 83.1                       | 88.3                                                     | 78.8 | 9.5   |
| 10         | .578                                      | .662                                                   | .443    | .219    | 82.8                       | 87.7                                                     | 79.0 | 8.7   |
| 11         | .579                                      | .669                                                   | .443    | .226    | 82.5                       | 86.9                                                     | 79.3 | 7.6   |

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of July, 1854.*

Hourly Means, &c. of the observations and of the hygrometrical elements  
dependent thereon. (Continued.)

| Hour.          | Mean Wet Bulb Ther-<br>mometer. | Dry Bulb above Wet. | Computed Dew Point. | Dry Bulb above Dew<br>Point. | Mean Elastic force of<br>Vapour. | Mean Weight of Vapour<br>in a cubic foot of air. | Additional weight of Va-<br>pour required for com-<br>plete saturation. | Mean degree of Humi-<br>dity, complete satura-<br>tion being unity. |
|----------------|---------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------|
|                | o                               | o                   | o                   | o                            | Inches.                          | T. gr.                                           | T. gr.                                                                  |                                                                     |
| Mid-<br>night. | 80.3                            | 1.6                 | 79.5                | 2.4                          | .0986                            | 10.62                                            | 0.82                                                                    | 0.928                                                               |
| 1              | 80.3                            | 1.4                 | 79.6                | 2.1                          | .989                             | .65                                              | .72                                                                     | .937                                                                |
| 2              | 80.2                            | 1.3                 | 79.5                | 2.0                          | .986                             | .62                                              | .69                                                                     | .939                                                                |
| 3              | 80.1                            | 1.2                 | 79.5                | 1.8                          | .986                             | .62                                              | .62                                                                     | .945                                                                |
| 4              | 79.9                            | 1.2                 | 79.3                | 1.8                          | .979                             | .55                                              | .62                                                                     | .944                                                                |
| 5              | 79.7                            | 1.1                 | 79.1                | 1.7                          | .973                             | .49                                              | .58                                                                     | .948                                                                |
| 6              | 79.8                            | 1.1                 | 79.2                | 1.7                          | .976                             | .52                                              | .58                                                                     | .948                                                                |
| 7              | 80.3                            | 1.4                 | 79.6                | 2.1                          | .989                             | .65                                              | .72                                                                     | .937                                                                |
| 8              | 81.1                            | 1.9                 | 80.1                | 2.9                          | 1.005                            | .77                                              | 1.05                                                                    | .911                                                                |
| 9              | 81.8                            | 2.8                 | 80.4                | 4.2                          | .014                             | .85                                              | .54                                                                     | .876                                                                |
| 10             | 82.3                            | 3.5                 | 80.5                | 5.3                          | .017                             | .87                                              | .96                                                                     | .847                                                                |
| 11             | 82.6                            | 4.1                 | 80.5                | 6.2                          | .017                             | .85                                              | 2.33                                                                    | .823                                                                |
| Noon.          | 82.9                            | 4.4                 | 80.7                | 6.6                          | .024                             | .89                                              | .52                                                                     | .812                                                                |
| 1              | 82.8                            | 4.4                 | 80.6                | 6.6                          | .021                             | .86                                              | .51                                                                     | .812                                                                |
| 2              | 82.8                            | 3.9                 | 80.8                | 5.9                          | .027                             | .94                                              | .24                                                                     | .830                                                                |
| 3              | 82.4                            | 4.2                 | 80.3                | 6.3                          | .011                             | .78                                              | .36                                                                     | .820                                                                |
| 4              | 82.4                            | 3.8                 | 80.5                | 5.7                          | .017                             | .85                                              | .14                                                                     | .835                                                                |
| 5              | 81.9                            | 3.4                 | 80.2                | 5.1                          | .008                             | .77                                              | 1.87                                                                    | .852                                                                |
| 6              | 81.7                            | 2.7                 | 80.3                | 4.1                          | .011                             | .82                                              | .49                                                                     | .879                                                                |
| 7              | 81.4                            | 2.5                 | 80.1                | 3.8                          | .005                             | .75                                              | .38                                                                     | .886                                                                |
| 8              | 81.0                            | 2.5                 | 79.7                | 3.8                          | 0.992                            | .63                                              | .37                                                                     | .886                                                                |
| 9              | 80.9                            | 2.2                 | 79.8                | 3.3                          | .995                             | .69                                              | .17                                                                     | .901                                                                |
| 10             | 80.9                            | 1.9                 | 79.9                | 2.9                          | .998                             | .72                                              | .03                                                                     | .912                                                                |
| 11             | 80.7                            | 1.8                 | 79.8                | 2.7                          | .995                             | .69                                              | 0.95                                                                    | .918                                                                |



*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta, in the  
month of July, 1854.*

Solar radiation, Weather, &c.

| Date. | Max Solar radiation.    | Rain. | Prevailing direction of the Wind.   | General aspect of the Sky.                                                                 |
|-------|-------------------------|-------|-------------------------------------|--------------------------------------------------------------------------------------------|
| 1     | o                       | Inc.  |                                     |                                                                                            |
| 2     | ..                      | ..    | S. sharp in the morn.               | Cloudy with flashes of lightning in the morning.                                           |
| 3     | <i>Sunday.</i><br>142.0 | 0.92  | ....                                |                                                                                            |
| 4     | ..                      | ..    | S. or S. E. or E.                   | Cloudless between 2 and 6 A. M. and cloudy the rest of the day, also drizzling at 5 P. M.  |
| 5     | ..                      | 0.10  | S. E. or E.                         | Cloudless till 4 A. M. cloudy afterwards with occasional raining.                          |
| 6     | 135.0                   | ..    | E. (high) or S. E. or S.            | Cloudy.                                                                                    |
| 7     | 136.0                   | ..    | S. occasionally sharp.              | Ditto and raining at 5 P. M.                                                               |
| 8     | 124.5                   | 0.15  | S.                                  | Ditto and raining occasionally.                                                            |
| 9     | ..                      | 0.40  | S.                                  | Ditto                                                                                      |
| 10    | <i>Sunday.</i><br>114.0 | 0.80  | ....                                |                                                                                            |
| 11    | 122.4                   | ..    | S. or S. W.                         | Cloudy.                                                                                    |
| 12    | 124.5                   | ..    | S. or S. E.                         | Ditto.                                                                                     |
| 13    | 129.0                   | ..    | S. E. or E.                         | Cloudy with occasional drizzling.                                                          |
| 14    | 117.0                   | 0.94  | E. or N. E. or S.                   | Cloudy and raining at 3 P. M.                                                              |
| 15    | 138.0                   | 0.57  | E. or N. or S.                      | Cloudy and raining between Noon and 3 P. M.                                                |
| 16    | <i>Sunday.</i><br>147.4 | ..    | S. or N. E.                         | Ditto and raining between 4 and 5 P. M.                                                    |
| 17    | ..                      | ..    | ....                                |                                                                                            |
| 18    | ..                      | ..    | S. E. or E. or N. E.                | Cloudy.                                                                                    |
| 19    | 119.0                   | 1.50  | N. E. or E.                         | Ditto and raining between 11 A. M. and 2 P. M.                                             |
| 20    | 141.0                   | ..    | S. E. or E.                         | Ditto and constantly raining.                                                              |
| 21    | 138.0                   | 0.19  | E. or S. E.                         | Ditto.                                                                                     |
| 22    | 140.6                   | 0.17  | E. or N. E.                         | Cloudless till 4 A. M. cloudy afterwards, also raining at 8 P. M.                          |
| 23    | <i>Sunday.</i><br>128.0 | 0.76  | S. E. or N. E. or E.                | Cloudless till 2 A. M. cloudy afterwards, also raining at 6 P. M.                          |
| 24    | 131.0                   | ..    | ....                                |                                                                                            |
| 25    | ..                      | ..    | E.                                  | Cloudy and dirzzling at Noon.                                                              |
| 26    | ..                      | 1.78  | { Calm or E. high<br>after sunset } | Cloudy with occasional drizzling.                                                          |
| 27    | ..                      | 0.46  | E. high till 1 P. M.                | Cloudy constantly drizzling or raining                                                     |
| 28    | ..                      | 0.26  | N. E. or E. or S. E.                | Cloudy till 7 P. M. cloudless afterwards, also drizzling between 3 A. M. and 4 P. M.       |
| 29    | 146.0                   | ..    | E. N. E. or N. W.                   | Cloudless till 1 A. M. cloudy afterwards, also drizzling between 7 and 8 A. M. and 9 P. M. |
| 30    | <i>Sunday.</i><br>144.3 | 1.60  | Calm or W. or N. W.                 | Cloudy.                                                                                    |
| 31    | ..                      | ..    | E. or N. or S. E.                   | Cloudy, constantly raining with thunder and lightning.                                     |

∩i Cirri ∩i cirro-strati, ∩i cumuli, ∩i cumulo-strati, ∩i nimbi, —i strati, ∩i cirro-cumuli.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of August, 1854.*

| Maximum pressure observed at 9.50 A. M. |            |              |         |           |                      |          |                        |                    |
|-----------------------------------------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------|
| Date.                                   | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky. |
|                                         |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                    |
| 1                                       | 29.083     | 92.0         | 91.8    | 81.9      | ..                   | ..       | S. E.                  | ✓ scattered        |
| 2                                       | 29.089     | 89.0         | 88.9    | 81.5      | ..                   | ..       | S. W.                  | ✓ Ditto            |
| 3                                       | 29.113     | 89.8         | 90.5    | 81.5      | ..                   | ..       | S. E.                  | ✓ Ditto            |
| 4                                       | 29.107     | 87.8         | 87.5    | 82.8      | ..                   | ..       | E.                     | ✓ all over         |
| 5                                       | 29.125     | 86.0         | 86.5    | 82.9      | ..                   | ..       | S. W.                  | ✓ Ditto            |
| 6                                       | 29.137     | 87.0         | 87.3    | 83.0      | ..                   | ..       | S. E.                  | ✓ scattered        |
| 7                                       | 29.099     | 85.0         | 85.5    | 82.4      | ..                   | ..       | N.                     | ✓ all over         |
| 8                                       | 29.079     | 84.0         | 83.9    | 80.0      | ..                   | ..       | W.                     | ✓ Ditto            |
| 9                                       | 29.087     | 84.5         | 84.5    | 79.0      | ..                   | ..       | W.                     | ✓ Ditto            |
| 10                                      | 29.111     | 85.0         | 85.4    | 80.0      | ..                   | ..       | N. W.                  | ✓ Ditto            |
| 11                                      | 29.109     | 85.1         | 84.9    | 78.6      | ..                   | ..       | N. W.                  | ✓ Ditto            |
| 12                                      | 29.091     | 82.0         | 82.2    | 78.3      | ..                   | ..       | N. W.                  | ✓ Ditto            |
| 13                                      | 29.105     | 81.0         | 81.2    | 80.0      | ..                   | ..       | W.                     | ✓ to E.            |
| 14                                      | 29.131     | 79.5         | 79.5    | 79.0      | ..                   | ..       | N. W.                  | ✓ all over         |
| 15                                      | 29.181     | 85.5         | 85.7    | 81.8      | ..                   | ..       | N. W.                  | ✓ Ditto            |
| 16                                      | 29.203     | 81.0         | 80.7    | 79.0      | ..                   | ..       | S. E.                  | ✓ Ditto            |
| 17                                      | 29.243     | 84.9         | 84.9    | 79.9      | ..                   | ..       | N. W.                  | ✓ Hazy             |
| 18                                      | 29.267     | 80.0         | 79.5    | 78.4      | ..                   | ..       | S. W.                  | ✓ all over         |
| 19                                      | 29.233     | 84.7         | 85.0    | 80.1      | ..                   | ..       | W.                     | ✓ scattered        |
| 20                                      | 29.225     | 84.0         | 84.6    | 80.0      | ..                   | ..       | W.                     | ✓ Ditto            |
| 21                                      | 29.247     | 83.5         | 83.8    | 80.5      | ..                   | ..       | N. W.                  | ✓ all over         |
| 22                                      | 29.219     | 84.8         | 84.6    | 79.5      | ..                   | ..       | W.                     | ✓ Ditto            |
| 23                                      | 29.149     | 84.0         | 84.1    | 79.1      | ..                   | ..       | W.                     | ✓ Ditto            |
| 24                                      | 29.195     | 83.7         | 83.7    | 78.5      | ..                   | ..       | S. W.                  | ✓ Ditto            |
| 25                                      | 29.193     | 85.0         | 85.2    | 79.9      | ..                   | ..       | W.                     | ✓ scattered        |
| 26                                      | 29.283     | 87.0         | 87.8    | 79.4      | ..                   | ..       | N. W.                  | ✓ Ditto            |
| 27                                      | 29.285     | 88.0         | 88.3    | 79.0      | ..                   | ..       | N.                     | ✓                  |
| 28                                      | 29.255     | 89.5         | 90.1    | 78.0      | ..                   | ..       | W.                     | Clear              |
| 29                                      | 29.267     | 90.0         | 90.5    | 78.5      | ..                   | ..       | N.                     | ✓ Ditto            |
| 30                                      | 29.233     | 90.5         | 91.5    | 76.6      | ..                   | ..       | N. W.                  | ✓ Ditto            |
| 31                                      | 29.223     | 92.1         | 92.8    | 72.5      | ..                   | ..       | N. W.                  | ✓ Ditto            |
| Mean.                                   | 29.173     | 85.7         | 85.8    | 79.7      | ..                   | ..       | ..                     | ....               |

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of August, 1854.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.  |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|---------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                     |
| 1     | 29.051     | 94.2         | 94.3    | 82.0      | ..                   | ..       | S.                     | ☞ scattered         |
| 2     | 29.055     | 90.7         | 91.0    | 82.9      | ..                   | ..       | S. W.                  | Ditto               |
| 3     | 29.071     | 92.5         | 93.5    | 82.0      | ..                   | ..       | S. E.                  | Ditto               |
| 4     | 29.089     | 89.0         | 89.1    | 82.5      | ..                   | ..       | E.                     | Ditto               |
| 5     | 29.101     | 89.0         | 89.1    | 82.5      | ..                   | ..       | E.                     | Ditto               |
| 6     | 29.109     | 84.0         | 84.2    | 82.0      | ..                   | ..       | N. E.                  | Ditto               |
| 7     | 29.067     | 83.2         | 82.3    | 80.4      | ..                   | ..       | W.                     | ☞ all over          |
| 8     | 29.051     | 85.5         | 85.8    | 81.5      | ..                   | ..       | W.                     | ☞ scattered         |
| 9     | 29.055     | 86.5         | 87.0    | 80.5      | ..                   | ..       | W.                     | Ditto               |
| 10    | 29.089     | 87.5         | 88.0    | 80.5      | ..                   | ..       | N. W.                  | ☞ all over          |
| 11    | 29.089     | 85.8         | 85.5    | 79.1      | ..                   | ..       | N. W.                  | Ditto               |
| 12    | 29.069     | 81.0         | 81.0    | 79.3      | ..                   | ..       | N. W.                  | Ditto               |
| 13    | 29.079     | 82.2         | 82.3    | 79.0      | ..                   | ..       | N. W.                  | Ditto               |
| 14    | 29.125     | 81.5         | 82.0    | 80.1      | ..                   | ..       | N. W.                  | Ditto               |
| 15    | 29.167     | 86.3         | 86.0    | 80.5      | ..                   | ..       | N. W.                  | ☞ scattered         |
| 16    | 29.187     | 82.0         | 81.8    | 79.4      | ..                   | ..       | S. E.                  | ☞ all over          |
| 17    | 29.227     | 85.9         | 85.4    | 80.0      | ..                   | ..       | N. W.                  | Ditto               |
| 18    | 29.241     | 80.9         | 81.0    | 78.6      | ..                   | ..       | W.                     | Ditto               |
| 19    | 29.225     | 86.9         | 87.2    | 80.7      | ..                   | ..       | W.                     | ☞ scattered         |
| 20    | 29.219     | 86.2         | 86.7    | 80.3      | ..                   | ..       | W.                     | Ditto               |
| 21    | 29.219     | 84.5         | 84.2    | 81.6      | ..                   | ..       | N. W.                  | ☞ all over          |
| 22    | 29.203     | 86.7         | 86.7    | 81.2      | ..                   | ..       | W.                     | ☞ scattered         |
| 23    | 29.149     | 86.0         | 86.2    | 79.5      | ..                   | ..       | W.                     | Hazy                |
| 24    | 29.173     | 85.3         | 85.5    | 78.4      | ..                   | ..       | S. W.                  | ☞ all over          |
| 25    | 29.179     | 87.0         | 87.6    | 78.6      | ..                   | ..       | W.                     | ☞ scattered in hor. |
| 26    | 29.283     | 89.5         | 90.4    | 79.5      | ..                   | ..       | N. W.                  | ☞ Do. towards do.   |
| 27    | 29.275     | 89.5         | 89.9    | 79.7      | ..                   | ..       | N. W.                  | ☞ scattered         |
| 28    | 29.243     | 92.5         | 93.4    | 79.1      | ..                   | ..       | W.                     | Clear               |
| 29    | 29.235     | 93.2         | 93.5    | 79.6      | ..                   | ..       | N.                     | Ditto               |
| 30    | 29.215     | 95.5         | 96.5    | 80.0      | ..                   | ..       | N. W.                  | Ditto               |
| 31    | 29.205     | 95.2         | 96.4    | 76.5      | ..                   | ..       | N. W.                  | Ditto               |
| Mean. | 29.135     | 87.2         | 81.7    | 80.2      | ..                   | ..       | ..                     | ....                |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of August, 1854.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Rain Gauge.                  |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.001     | 88.0         | 86.6    | 80.5      | 91.5                 | 82.3     | 86.9  | scattered          | 0.112                        | S. W.                  |
| 2     | 29.011     | 90.0         | 87.4    | 82.9      | 90.0                 | 83.5     | 86.75 | all over           | ..                           | S. E.                  |
| 3     | 29.005     | 86.5         | 84.3    | 81.6      | 92.0                 | 82.0     | 87.0  | Ditto              | 0.982                        | S. E.                  |
| 4     | 29.023     | 92.0         | 91.0    | 82.5      | 91.0                 | 81.5     | 86.25 | scattered          | 0.502                        | E.                     |
| 5     | 29.055     | 88.5         | 87.6    | 84.0      | 88.5                 | 84.0     | 86.25 | all over           | 0.102                        | S. E.                  |
| 6     | 29.031     | 83.3         | 83.3    | 80.5      | 83.0                 | 82.5     | 82.75 | Ditto              | 1.602                        | N.                     |
| 7     | 29.033     | 81.0         | 79.8    | 78.8      | 84.5                 | 81.0     | 82.75 | Ditto              | 1.102                        | W.                     |
| 8     | 28.973     | 82.2         | 81.6    | 80.0      | 85.6                 | 80.0     | 82.8  | Ditto              | 0.704                        | W.                     |
| 9     | 29.007     | 90.4         | 89.7    | 80.3      | 89.5                 | 80.0     | 84.75 | scattered          | ..                           | W.                     |
| 10    | 29.023     | 89.5         | 88.9    | 82.2      | 89.0                 | 81.0     | ..    | all over           | ..                           | N.W.                   |
| 11    | 29.015     | 85.7         | 83.8    | 81.3      | 85.2                 | 81.7     | 83.45 | Ditto              | ..                           | N.W.                   |
| 12    | 29.031     | 83.9         | 83.9    | 81.2      | 83.4                 | 79.5     | 81.45 | Ditto              | 0.954                        | N.W.                   |
| 13    | 29.047     | 85.0         | 84.9    | 81.0      | 84.6                 | 79.5     | 82.05 | Ditto              | 0.222                        | N.W.                   |
| 14    | 29.083     | 84.0         | 83.9    | 81.0      | 83.7                 | 77.5     | 80.6  | Ditto              | ..                           | N.W.                   |
| 15    | 29.109     | 87.9         | 87.2    | 82.5      | 87.0                 | 80.9     | 83.95 | Ditto              | ..                           | N.W.                   |
| 16    | 29.143     | 85.7         | 85.0    | 80.9      | 85.0                 | 81.0     | 83.0  | scattered          | 0.205                        | N. E.                  |
| 17    | 29.163     | 89.5         | 82.2    | 82.5      | 88.0                 | 79.5     | 83.75 | Ditto              | ..                           | N.W.                   |
| 18    | 29.159     | 84.5         | 83.9    | 80.0      | 84.0                 | 79.0     | 81.5  | Ditto              | 0.152                        | W.                     |
| 19    | 29.131     | 89.5         | 89.0    | 81.4      | 89.0                 | 78.8     | 83.9  | all over           | 0.772                        | W.                     |
| 20    | 29.111     | 88.3         | 89.0    | 81.0      | 89.5                 | 80.0     | 84.75 | scattered          | ..                           | N.W.                   |
| 21    | 29.163     | 85.3         | 83.5    | 81.2      | 83.4                 | 80.0     | 81.7  | all over           | ..                           | N.W.                   |
| 22    | 29.119     | 88.9         | 88.2    | 83.0      | 88.6                 | 81.5     | 85.05 | Ditto              | ..                           | W.                     |
| 23    | 29.105     | 87.5         | 87.0    | 81.0      | 87.0                 | 81.5     | 84.25 | Ditto              | ..                           | W.                     |
| 24    | 29.089     | 86.8         | 86.0    | 80.8      | 85.8                 | 80.5     | 83.15 | Ditto              | ..                           | N.W.                   |
| 25    | 29.123     | 91.9         | 91.4    | 80.4      | 91.0                 | 81.0     | 86.0  | scattered          | ..                           | W.                     |
| 26    | 29.199     | 93.5         | 93.5    | 80.8      | 93.5                 | 80.8     | 87.15 | Ditto              | ..                           | N.W.                   |
| 27    | 29.203     | 94.9         | 95.2    | 80.5      | 95.0                 | 81.0     | 88.0  | ..                 | ..                           | N.                     |
| 28    | 29.155     | 96.0         | 95.5    | 79.6      | 95.0                 | 80.8     | 87.9  | scattered          | ..                           | N.                     |
| 29    | 29.131     | 97.0         | 96.7    | 80.0      | 97.6                 | 81.4     | 89.5  | Ditto              | ..                           | N.                     |
| 30    | 29.141     | 99.4         | 98.0    | 80.4      | 97.5                 | 81.5     | 89.5  | Clear              | ..                           | N.W.                   |
| 31    | 29.123     | 99.9         | 99.5    | 79.0      | 99.0                 | 82.0     | 90.5  | Ditto              | ..                           | N.W.                   |
| Mn.   | 29.087     | 88.9         | 88.1    | 81.0      | 88.9                 | 80.8     | 84.91 | ..                 | 7.411                        |                        |

*Meteorological Remarks and Tables commencing 1st May, 1854, at  
the Residency, Lucknow.*

Site of observations. The Residency Surgeon's house.

The instruments, arranged in a northern verandah about 25 feet in breadth and raised 5 feet from the ground, are as follow :

Aneroid Barometer No. 10165 compared with the Newman's Standard No. 86, in the Surveyor General's Office, in Calcutta.

The instrument is suspended against the wall facing to the north and at the height of the level of the eye from the ground. It is perfectly sheltered and protected from accident or violence as from the direct or reflected rays of the sun. Attached to the Barometer is a small spirit thermometer.

2.—A wet and dry bulb thermometer by Newman ; placed near the Barometer.

3.—A simple mercurial thermometer.

4.—A pluviometer of simple construction.

The site is not very favorable for Meteorological Observations, being almost in the centre of the city, and consequently deprived to a certain extent of free circulation of pure air ; and being surrounded on all sides by buildings and small trees, the actual force and direction of the wind are often difficult to ascertain ; the condition of the atmosphere and the aspect of the sky are affected by the smoke and exhalations from the city.

J. FAYRER, M. D., F. R. G. S.

*Meteorological Observations kept at the Residency, Lucknow, for the Month of May, 1854.*

| At 6 A. M. |              |           |                 |                              | At 9 A. M.     |              |           |                              |                | Noon.        |           |                              |                |    |
|------------|--------------|-----------|-----------------|------------------------------|----------------|--------------|-----------|------------------------------|----------------|--------------|-----------|------------------------------|----------------|----|
| Date.      | Thermometer. |           | Aspect of Sky.  | Force and direction of Wind. | Aspect of Sky. | Thermometer. |           | Force and direction of Wind. | Aspect of Sky. | Thermometer. |           | Force and direction of Wind. | Aspect of Sky. |    |
|            | Wet Bulb.    | Dry Bulb. |                 |                              |                | Wet Bulb.    | Dry Bulb. |                              |                | Wet Bulb.    | Dry Bulb. |                              |                |    |
| 1          | 66           | 80        | Clear.          | Calm.                        | Clear.         | 67           | 88        | Calm.                        | Clear.         | 68           | 96        | Calm.                        | Clear.         |    |
| 2          | 72           | 84        | Hazy            | Ditto.                       |                | *            |           |                              |                | 75           | 91        | S. E. lt.                    | Hazy.          |    |
| 3          | *            |           |                 |                              |                | 74           | 87        |                              |                | *            |           |                              |                |    |
| 4          | 70           | 84        | Thunderculo-st. | E N. E.                      |                | 72           | 86        | Fr. S. E.                    | Hazy.          | 72           | 86        | E. fresh.                    | Cumul.         |    |
| 5          | 69           | 78        | Curio-st. hazy. | East lt.                     |                | 72           | 84        | Fr. E. N. E.                 | Ciri.          | 73           | 88        | Ditto.                       | Ditto.         |    |
| 6          | 72           | 81        | Curio-strati.   | N. E. lt.                    |                | 71           | 83        | S. E. fr.                    | Curio-st.      | 78           | 87        | S. E. stdy.                  | Curio-cum.     |    |
| 7          | 72           | 82        | E. light.       | N. E. lt.                    |                | 75           | 86        | S. E. lt.                    | Ciri.          | 74           | 90        | Ditto lt.                    | Cumul.         |    |
| 8          | 69           | 79        | Clear.          | E. light.                    |                | 73           | 83        | S. E. stdy.                  | Curio-cum.     | 72           | 87        | N. W. lt.                    | Ciri.          |    |
| 9          | 72           | 83        | Cumul.          | Curio-st.                    |                | *            |           | Calm.                        | Ciri.          | 73           | 91        | Ditto.                       | Ditto.         |    |
| 10         | 68           | 81        | Clear.          | N. W.                        |                | *            |           |                              |                | 68           | 89        | S. W. lt.                    | Ditto.         |    |
| 11         | 67           | 84        | Ditto.          | Calm.                        |                | 69           | 89        | S. W. lt.                    | Clear.         | 69           | 92        | S. W. fr.                    | Ditto.         |    |
| 12         | 67           | 83        | Ditto.          | Ditto.                       |                | 68           | 91        | Ditto.                       | Ciri.          | 71           | 94        | Ditto.                       | Clear.         |    |
| 13         | 69           | 85        | Ditto.          | Ditto.                       |                | 71           | 90        | N. W. lt.                    | Ditto.         | *            |           |                              |                |    |
| 14         | 73           | 89        | Ciri.           | Ditto.                       |                | *            |           |                              |                | *            |           |                              |                |    |
| 15         | *            |           |                 |                              |                | 74           | 93        | Calm.                        | Clear.         | 74           | 98        | Calm.                        | Curio.         |    |
| 16         | 78           | 88        | ....            |                              |                | *            |           |                              |                | 74           | 94        | S. W. lt.                    | Ciri-cum.      |    |
| 17         | 71           | 88        | Hazy.           | Calm.                        |                | *            |           |                              |                | 74           | 94        | Ditto.                       | Hazy.          |    |
| 18         | 72           | 88        | Ditto.          | Ditto.                       |                | *            |           |                              |                | 77           | 95        | Ditto.                       | Ditto.         |    |
| 19         | 71           | 85        | Clear.          | Ditto.                       |                | 74           | 93        | Lt. S. W.                    | Clear.         | 73           | 98        | West lt.                     | Ditto.         |    |
| 20         | 67           | 87        | Ditto.          | Ditto.                       |                | 70           | 93        | S. W. lt.                    | Ditto.         | 71           | 96        | S. W. lt.                    | Clear.         |    |
| 21         | 65           | 87        | Ditto.          | Ditto.                       |                | *            |           |                              |                | 73           | 97        | Calm.                        | Ditto.         |    |
| 22         | 69           | 87        | Ditto.          | Ditto.                       |                | *            |           |                              |                | 73           | 99        | Ditto.                       | Ditto.         |    |
| 23         | 70           | 86        | Ditto.          | Ditto.                       |                | 75           | 93        | S. W. lt.                    | Clear.         | 76           | 100       | Ditto.                       | Ditto.         |    |
| 24         | 72           | 87        | Ditto.          | Ditto.                       |                | 72           | 94        | S. W. lt.                    | Clear.         | 74           | 102       | Ditto.                       | Ditto.         |    |
| 25         | 70           | 88        | Ditto.          | Ditto.                       |                | 80           | 95        | S. W. lt.                    | Clear.         | 72           | 104       | Ditto.                       | Ditto.         |    |
| 26         | 73           | 89        | Ditto.          | South lt.                    |                | 81           | 95        | S. E. lt.                    | Ditto.         | 78           | 101       | S. E. lt.                    | Ditto.         |    |
| 27         | 79           | 92        | Ditto.          | S. E. lt.                    |                | 80           | 95        | Ditto.                       | Ditto.         | 80           | 99        | Ditto.                       | Ditto.         |    |
| 28         | 79           | 93        | Hazy in East.   | Calm.                        |                | *            |           | S. E. fr.                    | Hazy in E.     | *            |           |                              |                |    |
| 29         | 79           | 91        | Ditto.          | Ditto.                       |                | 79           | 92        | S. E. fr.                    | Hazy.          | 81           | 100       | S. E. lt.                    | Ditto.         |    |
| 30         | 78           | 91        | Ditto.          | S. E. lt.                    |                | 81           | 94        | Ditto.                       | Clear.         | 81           | 96        | N. E. lt.                    | Ditto.         |    |
| 31         | 79           | 91        | Clear.          | Ditto.                       |                | 81           | 94        |                              |                | *            |           |                              |                |    |
| Total.     | 2078         | 2491      | ....            | ..                           |                | 1478         | 1804      | ..                           | 58.924         |              | 1924      | 2464                         | ..             | .. |
| Averg.     | 71.655       | 85.896    | ....            | ..                           |                | 739          | 902       | ..                           | 29.462         |              | 74        | 94.769                       | ..             | .. |

\* No observation.

*Meteorological Observations kept at the Residency, Lucknow, for the Month of May, 1854.*

| At 3 P. M.   |           |           |                              |                | At 6 P. M.   |           |                              |                |              | At 9 P. M. |                              |                |                    |                                 |
|--------------|-----------|-----------|------------------------------|----------------|--------------|-----------|------------------------------|----------------|--------------|------------|------------------------------|----------------|--------------------|---------------------------------|
| Thermometer. | Wet Bulb. |           | Force and direction of Wind. | Aspect of Sky. | Thermometer. |           | Force and direction of Wind. | Aspect of Sky. | Thermometer. |            | Force and direction of Wind. | Aspect of Sky. | Rain Gauge Inchee. | Remarks.                        |
|              | Wet Bulb. | Dry Bulb. |                              |                | Wet Bulb.    | Dry Bulb. |                              |                | Wet Bulb.    | Dry Bulb.  |                              |                |                    |                                 |
| * 73         | 94        | 29.45     | S. E. lt.                    | Hazy.          | 68           | 95        | 29.42                        | S. W. lt.      | Hazy.        | ..         | ..                           | ..             | ..                 | Dust storm at 3 P. M.           |
| * 72         | 86        | 29.50     | E. fresh.                    | Hazy.          | 72           | 93        | 29.47                        | S. E. lt.      | Clear.       | ..         | ..                           | ..             | ..                 | Fresh breeze—S. E.              |
| * 74         | 89        | 29.48     | Ditto.                       | Ditto.         | 74           | 92        | 29.50                        | Calm.          | Ditto.       | 73         | 83                           | 29.53          | Clear.             | all day.                        |
| * 73         | 87        | 29.46     | N. W. fr.                    | { Dust storm.  | 73           | 89        | 29.48                        | Lt. E.         | Clear.       | ..         | ..                           | ..             | ..                 | Light rain last night.          |
| * 73         | 92        | 29.49     | N. W. lt.                    | Ciri.          | 71           | 85        | 29.44                        | Ditto.         | Ditto.       | 73         | 87                           | 29.56          | Ciri.              | [day, light air at sunset.      |
| 68           | 91        | 29.48     | N. W. fr.                    | Curo-st.       | 71           | 85        | 29.44                        | Lt. N. E.      | Cumuli.      | 77         | 83                           | 29.50          | Ditto.             | Fr. breeze during the           |
| 69           | 94        | 29.48     | Ditto.                       | Ditto.         | ..           | ..        | ..                           | ..             | ..           | ..         | ..                           | ..             | ..                 | Dust storm at 2 P. M.           |
| ..           | ..        | ..        | ..                           | ..             | ..           | ..        | ..                           | ..             | ..           | ..         | ..                           | ..             | ..                 | Light shower rain in evening.   |
| ..           | ..        | ..        | ..                           | ..             | 72           | 96        | 29.48                        | Calm.          | Clear.       | ..         | ..                           | ..             | ..                 | Shower at 2 P. M.               |
| 74           | 99        | 29.56     | Calm.                        | C-cum.         | 72           | 96        | 29.47                        | Ditto.         | Ditto.       | ..         | ..                           | ..             | ..                 | none registered.                |
| 73           | 96        | 29.55     | Lt. S. W.                    | Ditto.         | 73           | 92        | 29.47                        | Ditto.         | Ditto.       | ..         | ..                           | ..             | ..                 | Dust storm at 6 P. M.           |
| 74           | 96        | 29.57     | Ditto.                       | Hazy.          | 74           | 94        | 29.55                        | Fresh.         | V. storm.    | ..         | ..                           | ..             | ..                 | very vt. drops of rn.           |
| 75           | 96        | 29.62     | Ditto.                       | Cumuli.        | 72           | 95        | 29.47                        | Lt. S. W.      | Ciri.        | ..         | ..                           | ..             | ..                 | Dust storm in the nt.           |
| ..           | ..        | ..        | ..                           | ..             | 73           | 95        | 29.53                        | S. W. lt.      | Hazy.        | ..         | ..                           | ..             | ..                 | Weather intensely hot.          |
| 70           | 98        | 29.50     | S. W. lt.                    | Ciri.          | 73           | 97        | 29.60                        | Ditto.         | C-cum.       | ..         | ..                           | ..             | ..                 | Ditto. [until sunset.           |
| 72           | 91        | 29.47     | Calm.                        | Clear.         | 72           | 97        | 29.47                        | Calm.          | Hazy.        | ..         | ..                           | ..             | ..                 | Intensely hot wind              |
| 73           | 101       | 29.43     | N. W. fr.                    | Ditto.         | 70           | 97        | 29.47                        | Ditto.         | Ditto.       | ..         | ..                           | ..             | ..                 | Ditto.                          |
| 78           | 101       | 29.40     | Ditto.                       | Ditto.         | ..           | ..        | ..                           | ..             | ..           | ..         | ..                           | ..             | ..                 | Ditto. [113.                    |
| 73           | 103       | 29.38     | Ditto.                       | Ditto.         | 72           | 101       | 29.38                        | Ditto.         | Ditto.       | ..         | ..                           | ..             | ..                 | Temp. in shade at noon          |
| * 73         | 105       | 29.28     | S. lt.                       | Clear.         | ..           | ..        | ..                           | ..             | ..           | ..         | ..                           | ..             | ..                 | Do. 87 & 91°                    |
| 76           | 104       | 29.27     | S. W. lt.                    | Ditto.         | 73           | 102       | 29.34                        | Ditto.         | Clear.       | ..         | ..                           | ..             | ..                 | Temp. in hot wind 112.          |
| 79           | 103       | 29.26     | Ditto.                       | Ditto.         | 72           | 103       | 29.27                        | Ditto.         | Hazy.        | ..         | ..                           | ..             | ..                 | At noon 93°                     |
| 81           | 102       | 29.28     | S. E. lt.                    | Ditto.         | 74           | 103       | 29.27                        | N. W. fr.      | Clear.       | ..         | ..                           | ..             | ..                 | Cr. wr. S. E. wind at n.        |
| 79           | 102       | 29.32     | Ditto.                       | Ditto.         | 77           | 103       | 29.23                        | S. W. lt.      | Ditto.       | ..         | ..                           | ..             | ..                 | At 3 P. M. 90°                  |
| 79           | 102       | 29.32     | Ditto.                       | Ditto.         | 78           | 103       | 29.25                        | Ditto.         | Ditto.       | ..         | ..                           | ..             | ..                 | Wind changed about 2 to 3 P. M. |
| 81           | 100       | 29.32     | Ditto.                       | Ditto.         | 81           | 97        | 29.25                        | S. E. stdy.    | Hazy.        | ..         | ..                           | ..             | ..                 |                                 |
| ..           | ..        | ..        | ..                           | ..             | 79           | 100       | 29.28                        | S. E. lt.      | Curo.        | ..         | ..                           | ..             | ..                 |                                 |
| ..           | ..        | ..        | ..                           | ..             | ..           | 101       | 29.30                        | Ditto.         | Ditto.       | ..         | ..                           | ..             | ..                 | Strong S. E. wind last          |
| 1.633        | 2.130     | 64.755    | ..                           | ..             | 1.760        | 2.398     | 73.538                       | ..             | ..           | 223        | 253                          | 8859           | ..                 | .....                           |
| 74.227       | 95.819    | 29.434    | ..                           | ..             | 73.333       | 9.592     | 29.415                       | ..             | ..           | 74.333     | 84.333                       | 2953           | ..                 | .....                           |

• No observation.

Abstract of the Meteorological Register for May, 1854.

Lucknow, 1st June, 1854.

| Thermometer<br>6 A. M. |          |        | Thermometer<br>9 A. M. |          |        | Thermometer<br>Noon. |          |        | Thermometer<br>3 P. M. |          |        | Thermometer<br>6 P. M. |          |        | Thermometer<br>9 P. M. |          |       | Remarks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------|----------|--------|------------------------|----------|--------|----------------------|----------|--------|------------------------|----------|--------|------------------------|----------|--------|------------------------|----------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maximum.               | Minimum. | Mid.   | Maximum.               | Minimum. | Mid.   | Maximum.             | Minimum. | Mid.   | Maximum.               | Minimum. | Mid.   | Maximum.               | Minimum. | Mid.   | Maximum.               | Minimum. | Mid.  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                        |          |        |                        |          |        |                      |          |        |                        |          |        |                        |          |        |                        |          |       | The weather this month very hot and dry.<br>During the early part of it South West wind prevailed; during the latter part variable frequently from the East and South East.<br>Dust Storms frequent, one of great violence on the 15th. Light showers of rain attended by thunder and lightning have fallen occasionally, but the quantity was not appreciable in the pluviometer.<br>Towards the latter part of the month the Eastern horizon clouded and frequent lightning in the same quarter. Temperature of the hot wind in the shade by frequent observations 112-110. At the same time behind the Tuttee the Thermometer stood at 85-87-90. |
| Wet...                 | 79       | 65     | 71.655                 | 81       | 67     | 73.9                 | 81       | 68     | 74                     | 81       | 68     | 74.227                 | 81       | 68     | 73.333                 | 77       | 73    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Dry...                 | 93       | 78     | 85.896                 | 95       | 83     | 90.2                 | 10.486   | 94.769 | 10.586                 | 96.819   | 10.385 | 95.92                  | 87       | 83     | 84.333                 |          |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Barometer<br>6 A. M.   |          |        | Barometer<br>9 A. M.   |          |        | Barometer<br>Noon.   |          |        | Barometer<br>3 P. M.   |          |        | Barometer<br>6 P. M.   |          |        | Barometer<br>9 P. M.   |          |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Maximum.               | Minimum. | Mid.   | Maximum.               | Minimum. | Mid.   | Maximum.             | Minimum. | Mid.   | Maximum.               | Minimum. | Mid.   | Maximum.               | Minimum. | Mid.   | Maximum.               | Minimum. | Mid.  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 29.57                  | 29.20    | 29.455 | 29.62                  | 29.28    | 29.462 | 29.68                | 29.30    | 29.501 | 29.62                  | 29.26    | 29.434 | 29.60                  | 29.23    | 29.415 | 29.56                  | 29.50    | 29.53 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Of 29 Observations.    |          |        | Of 20 Observations.    |          |        | Of 26 Observations.  |          |        | Of 22 Observations.    |          |        | Of 25 Observations.    |          |        | Of 3 Observations.     |          |       | J. P.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |





*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of September, 1854.*

Maximum pressure observed at 9.50 A. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1     | 29.217     | 93.5         | 93.8    | 81.4      | ..                   | ..       | N.                     | Clear                |
| 2     | 29.233     | 93.5         | 92.5    | 83.4      | ..                   | ..       | N. E.                  | ✓ scattered          |
| 3     | 29.273     | 91.6         | 91.0    | 80.9      | ..                   | ..       | ..                     | .....                |
| 4     | 29.225     | 86.7         | 87.3    | 82.5      | ..                   | ..       | ..                     | ✓ scattered          |
| 5     | 29.199     | 87.0         | 87.0    | 82.5      | ..                   | ..       | N. E.                  | Ditto                |
| 6     | 29.183     | 85.6         | 86.0    | 82.4      | ..                   | ..       | N.                     | ✓ all over           |
| 7     | 29.171     | 86.6         | 86.3    | 81.5      | ..                   | ..       | N. E.                  | ✓ scattered all over |
| 8     | 29.145     | 82.7         | 83.1    | 80.5      | ..                   | ..       | N. E.                  | ✓ all over           |
| 9     | 29.157     | 84.0         | 84.7    | 80.7      | ..                   | ..       | N.                     | Ditto                |
| 10    | 29.211     | 86.0         | 86.5    | 81.0      | ..                   | ..       | N. W.                  | Ditto                |
| 11    | 29.229     | 88.5         | 89.5    | 82.0      | ..                   | ..       | E.                     | ✓ scattered          |
| 12    | 29.161     | 89.7         | 90.3    | 80.4      | ..                   | ..       | N. E.                  | ✓ Ditto              |
| 13    | 29.023     | 85.0         | 84.6    | 79.5      | ..                   | ..       | N. W.                  | ✓ all over           |
| 14    | 29.207     | 85.6         | 85.0    | 78.0      | ..                   | ..       | ..                     | Ditto                |
| 15    | 29.205     | 85.0         | 84.6    | 79.2      | ..                   | ..       | ..                     | Ditto                |
| 16    | 29.241     | 84.7         | 84.4    | 80.0      | ..                   | ..       | N. W.                  | Clear                |
| 17    | 29.251     | 84.0         | 83.6    | 80.0      | ..                   | ..       | ..                     | ✓ all over           |
| 18    | 29.295     | 84.5         | 85.2    | 79.8      | ..                   | ..       | N. W.                  | ✓ scattered          |
| 19    | 29.327     | 85.1         | 85.2    | 80.0      | ..                   | ..       | N. W.                  | Clear                |
| 20    | 29.345     | 85.0         | 85.4    | 78.0      | ..                   | ..       | N. W.                  | ✓ scattered          |
| 21    | 29.389     | 85.5         | 86.2    | 77.0      | ..                   | ..       | N. W.                  | Clear                |
| 22    | 29.397     | 86.2         | 86.2    | 77.0      | ..                   | ..       | N. W.                  | ✓ scattered          |
| 23    | 29.367     | 87.8         | 88.0    | 79.4      | ..                   | ..       | N.                     | Ditto                |
| 24    | 29.375     | 89.5         | 88.7    | 79.0      | ..                   | ..       | N. W.                  | ✓ Ditto              |
| 25    | 29.409     | 89.0         | 90.0    | 80.5      | ..                   | ..       | N. E.                  | ✓ Ditto              |
| 26    | 29.405     | 88.4         | 89.0    | 80.0      | ..                   | ..       | N.                     | ✓ Ditto              |
| 27    | 29.373     | 80.0         | 80.0    | 75.0      | ..                   | ..       | E.                     | ✓ Ditto              |
| 28    | 29.429     | 77.5         | 77.7    | 73.5      | ..                   | ..       | N. E.                  | ✓ Ditto all over     |
| 29    | 29.393     | 78.3         | 78.5    | 74.5      | ..                   | ..       | N. W.                  | ✓ Ditto              |
| 30    | 29.369     | 82.7         | 83.5    | 74.0      | ..                   | ..       | N. W.                  | ✓ Ditto              |
| Mean. | 29.273     | 85.9         | 86.1    | 80.1      | ..                   | ..       | ..                     | ....                 |

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of September, 1854.*

## Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky. |
|-------|------------|--------------|---------|-----------|----------------------|----------|------------------------|--------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                    |
| 1     | 29.193     | 95.7         | 96.4    | 79.5      | ..                   | ..       | N.                     | Clear              |
| 2     | 29.205     | 95.0         | 95.0    | 82.5      | ..                   | ..       | N. E.                  | ✓ scattered        |
| 3     | 29.239     | 89.0         | 87.2    | 81.5      | ..                   | ..       | S. E.                  | ✓ Ditto            |
| 4     | 29.193     | 89.0         | 89.5    | 82.8      | ..                   | ..       | S. E.                  | Ditto towards hor. |
| 5     | 29.163     | 88.8         | 89.0    | 82.5      | ..                   | ..       | N. E.                  | ✓ scattered        |
| 6     | 29.151     | 87.0         | 87.8    | 82.4      | ..                   | ..       | N.                     | ✓ Ditto            |
| 7     | 29.147     | 85.8         | 79.9    | 79.5      | ..                   | ..       | N. E.                  | ✓ raining          |
| 8     | 29.119     | 84.5         | 84.9    | 80.6      | ..                   | ..       | N. E.                  | ✓ all over         |
| 9     | 29.131     | 86.7         | 87.0    | 81.2      | ..                   | ..       | N.                     | Ditto              |
| 10    | 29.193     | 88.2         | 88.7    | 81.5      | ..                   | ..       | N.                     | Ditto              |
| 11    | 29.207     | 89.9         | 90.4    | 81.5      | ..                   | ..       | E.                     | ✓ scattered        |
| 12    | 29.135     | 90.7         | 91.0    | 80.5      | ..                   | ..       | N. E.                  | ✓ Ditto            |
| 13    | 28.999     | 81.5         | 79.4    | 76.0      | ..                   | ..       | N. W.                  | ✓ all over         |
| 14    | 29.193     | 87.2         | 86.6    | 78.5      | ..                   | ..       | ..                     | Ditto              |
| 15    | 29.201     | 85.9         | 85.6    | 80.0      | ..                   | ..       | ..                     | Ditto              |
| 16    | 29.207     | 86.5         | 86.4    | 79.5      | ..                   | ..       | N. W.                  | ✓ towards W.       |
| 17    | 29.213     | 84.9         | 84.4    | 80.2      | ..                   | ..       | W.                     | ✓ all over         |
| 18    | 29.277     | 86.0         | 86.4    | 79.5      | ..                   | ..       | N. W.                  | ✓ scattered        |
| 19    | 29.309     | 86.2         | 86.2    | 80.0      | ..                   | ..       | N. W.                  | ✓ all over         |
| 20    | 29.333     | 86.8         | 87.1    | 78.8      | ..                   | ..       | N. W.                  | ✓ scattered        |
| 21    | 29.363     | 88.5         | 89.0    | 77.5      | ..                   | ..       | N. W.                  | Ditto              |
| 22    | 29.375     | 87.8         | 87.8    | 77.7      | ..                   | ..       | N. W.                  | Ditto              |
| 23    | 29.333     | 89.1         | 89.5    | 80.0      | ..                   | ..       | N.                     | Ditto              |
| 24    | 29.329     | 91.0         | 91.4    | 80.6      | ..                   | ..       | W.                     | ✓ Ditto            |
| 25    | 29.379     | 90.7         | 91.2    | 79.2      | ..                   | ..       | N. E.                  | ✓ Ditto            |
| 26    | 29.361     | 89.0         | 89.5    | 80.0      | ..                   | ..       | N.                     | ✓ Ditto            |
| 27    | 29.365     | 81.7         | 81.9    | 76.0      | ..                   | ..       | E.                     | Ditto              |
| 28    | 29.403     | 79.0         | 79.3    | 74.5      | ..                   | ..       | N. E.                  | Ditto              |
| 29    | 29.371     | 80.7         | 81.3    | 76.0      | ..                   | ..       | N. W.                  | Ditto              |
| 30    | 29.355     | 83.8         | 84.2    | 74.5      | ..                   | ..       | N. W.                  | Ditto              |
| Mean. | 29.248     | 87.2         | 87.1    | 79.4      | ..                   | ..       | ..                     | ....               |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of September, 1854.*

Minimum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.        | Rain Gauge.                  |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|---------------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                           | 3 Ft. 2 In. from the ground. | Direction of the Wind. |
| 1     | 29.117     | 100.9        | 100.0   | 81.8      | 99.5                 | 82.5     | 91.0  | Clear [W.                 | ..                           | N. E.                  |
| 2     | 29.133     | 96.9         | 94.5    | 84.0      | 94.0                 | 82.0     | 88.0  | ↘ towards                 | ..                           | N. E.                  |
| 3     | 29.145     | 90.5         | 90.3    | 81.5      | 91.0                 | 81.0     | 86.0  | ↘ do. all over.           | ..                           | S. E.                  |
| 4     | 29.119     | 85.9         | 85.0    | 80.6      | 87.0                 | 78.5     | 82.75 | ↘ scattered towards shor. | 0.732                        | ..                     |
| 5     | 29.105     | 87.5         | 84.5    | 80.5      | 86.0                 | 78.0     | 82.0  | ↘ all over                | 0.102                        | N. E.                  |
| 6     | 29.065     | 88.8         | 87.5    | 80.5      | 86.6                 | 77.2     | 81.9  | Ditto                     | ..                           | E.                     |
| 7     | 28.079     | 83.0         | 82.9    | 79.5      | 83.0                 | 77.5     | 80.25 | Ditto                     | 0.442                        | ..                     |
| 8     | 29.015     | 86.5         | 85.5    | 81.4      | 85.0                 | 76.0     | 80.5  | Ditto                     | ..                           | N. E.                  |
| 9     | 29.035     | 87.9         | 88.0    | 82.0      | 88.4                 | 76.0     | 82.2  | Ditto                     | ..                           | N.                     |
| 10    | 29.103     | 90.7         | 90.4    | 82.1      | 90.0                 | 76.5     | 83.25 | Ditto                     | ..                           | N.                     |
| 11    | 29.103     | 92.8         | 92.8    | 82.4      | 92.3                 | 77.3     | 84.8  | ↘ scattered               | ..                           | E.                     |
| 12    | 29.055     | 93.0         | 92.2    | 80.0      | 93.0                 | 78.0     | 85.5  | ↘ Ditto                   | ..                           | E.                     |
| 13    | 28.931     | 81.0         | 79.8    | 76.0      | 86.0                 | 77.0     | 81.5  | ↘ all over                | 2.082                        | N.W.                   |
| 14    | 29.161     | 88.0         | 87.0    | 79.0      | 88.0                 | 77.2     | 82.6  | Ditto                     | 0.052                        | ..                     |
| 15    | 29.117     | 87.5         | 87.0    | 80.5      | 88.5                 | 77.4     | 82.95 | ↘ scattered               | ..                           | N.W.                   |
| 16    | 29.189     | 87.9         | 87.6    | 79.6      | 86.9                 | 77.0     | 81.95 | ↘ twds. W.                | ..                           | N.W.                   |
| 17    | 29.197     | 86.0         | 86.5    | 81.0      | 80.0                 | 77.2     | 78.6  | ↘ all over                | ..                           | W.                     |
| 18    | 29.195     | 89.5         | 88.5    | 80.1      | 84.0                 | 77.0     | 82.5  | ↘ scattered               | 0.512                        | N.W.                   |
| 19    | 29.245     | 89.5         | 89.3    | 80.4      | 89.2                 | 77.5     | 83.35 | ↘ Ditto                   | ..                           | N.W.                   |
| 20    | 29.261     | 91.0         | 90.6    | 81.9      | 91.0                 | 78.0     | 84.5  | Ditto                     | ..                           | N.W.                   |
| 21    | 29.289     | 92.6         | 92.0    | 80.6      | 91.8                 | 78.0     | 84.9  | Ditto                     | ..                           | W.                     |
| 22    | 29.291     | 90.8         | 89.4    | 79.5      | 89.2                 | 78.0     | 83.6  | Ditto                     | ..                           | N.                     |
| 23    | 29.227     | 93.0         | 91.7    | 80.2      | 92.0                 | 76.0     | 84.0  | Ditto                     | ..                           | N.                     |
| 24    | 29.249     | 94.7         | 93.3    | 81.0      | 94.0                 | 76.2     | 85.1  | ↘ Ditto                   | ..                           | N.W.                   |
| 25    | 29.309     | 92.1         | 91.4    | 80.6      | 92.0                 | 76.5     | 84.25 | Ditto                     | ..                           | N. E.                  |
| 26    | 29.325     | 79.8         | 79.0    | 75.8      | 90.0                 | 77.0     | 83.5  | ↘ all over                | 1.082                        | N. E.                  |
| 27    | 29.301     | 85.2         | 85.6    | 76.3      | 86.0                 | 76.6     | 81.3  | ↘ scattered               | ..                           | N.W.                   |
| 28    | 29.329     | 81.5         | 80.4    | 75.9      | 80.0                 | 77.0     | 78.5  | ↘ Ditto                   | ..                           | E.                     |
| 29    | 29.317     | 84.0         | 84.9    | 76.7      | 84.3                 | 76.2     | 80.25 | ↘ Ditto                   | ..                           | N.W.                   |
| 30    | 29.283     | 89.9         | 89.9    | 75.0      | 89.5                 | 77.4     | 83.45 | Ditto                     | ..                           | N.W.                   |
| Mn.   | 29.176     | 88.9         | 88.2    | 79.8      | 88.7                 | 77.5     | 83.16 | ..                        | 5.004                        | ..                     |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of October, 1854.*

| Maximum pressure observed at 9.50 A. M. |            |              |         |           |                      |          |                        |                      |
|-----------------------------------------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
| Date.                                   | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|                                         |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1                                       | 29.371     | 83.3         | 83.7    | 74.2      | ..                   | ..       | ..                     | ~ scattered          |
| 2                                       | 29.375     | 86.0         | 86.4    | 75.5      | ..                   | ..       | W.                     | Clear [in zenith.    |
| 3                                       | 29.419     | 86.8         | 88.0    | 73.0      | ..                   | ..       | N. W.                  | ~ very few scattered |
| 4                                       | 29.431     | 85.0         | 86.5    | 70.5      | ..                   | ..       | N. W.                  | Clear                |
| 5                                       | 29.441     | 83.2         | 84.7    | 72.0      | ..                   | ..       | N. W.                  | ~ scattered          |
| 6                                       | 29.397     | 81.9         | 81.9    | 77.6      | ..                   | ..       | N.                     | ~ all over           |
| 7                                       | 29.355     | 78.5         | 78.5    | 76.6      | ..                   | ..       | N. E.                  | Ditto                |
| 8                                       | 29.367     | 79.5         | 80.0    | 77.0      | ..                   | ..       | E.                     | Ditto                |
| 9                                       | 29.405     | 82.2         | 82.4    | 77.5      | ..                   | ..       | S. E.                  | ~ scattered          |
| 10                                      | 29.505     | 83.5         | 83.7    | 77.8      | ..                   | ..       | W.                     | ~ Ditto              |
| 11                                      | 29.451     | 81.5         | 81.8    | 74.5      | ..                   | ..       | N. W.                  | ~ Ditto              |
| 12                                      | 29.419     | 80.8         | 81.5    | 74.8      | ..                   | ..       | N. W.                  | Clear                |
| 13                                      | 29.451     | 82.7         | 83.0    | 74.0      | ..                   | ..       | S. W.                  | Ditto                |
| 14                                      | 29.517     | 83.0         | 83.4    | 71.8      | ..                   | ..       | W.                     | Ditto                |
| 15                                      | 29.505     | 81.0         | 81.3    | 69.5      | ..                   | ..       | ..                     | Ditto                |
| 16                                      | 29.529     | 78.9         | 80.9    | 64.0      | ..                   | ..       | N. W.                  | Ditto                |
| 17                                      | 29.509     | 78.0         | 80.3    | 64.0      | ..                   | ..       | N. W.                  | Ditto                |
| 18                                      | 29.505     | 78.0         | 79.1    | 65.7      | ..                   | ..       | N. W.                  | Ditto                |
| 19                                      | 29.493     | 79.9         | 81.7    | 64.9      | ..                   | ..       | N.                     | Ditto                |
| 20                                      | 29.529     | 77.0         | 79.5    | 64.7      | ..                   | ..       | N. W.                  | Ditto                |
| 21                                      | 29.547     | 77.1         | 78.7    | 64.0      | ..                   | ..       | N.                     | Ditto                |
| 22                                      | 29.507     | 76.0         | 76.4    | 63.0      | ..                   | ..       | ..                     | Ditto                |
| 23                                      | 29.497     | 75.0         | 76.8    | 65.0      | ..                   | ..       | N.                     | Ditto                |
| 24                                      | 29.515     | 74.5         | 77.0    | 64.0      | ..                   | ..       | N. W.                  | Ditto                |
| 25                                      | 29.539     | 77.0         | 79.5    | 63.0      | ..                   | ..       | N. W.                  | Ditto                |
| 26                                      | 29.531     | 76.2         | 78.0    | 63.0      | ..                   | ..       | N. W.                  | Ditto                |
| 27                                      | 29.511     | 73.0         | 74.4    | 58.0      | ..                   | ..       | N. W.                  | Ditto                |
| 28                                      | 29.539     | 72.5         | 75.0    | 59.0      | ..                   | ..       | N. W.                  | Ditto                |
| 29                                      | 29.547     | 73.8         | 76.0    | 60.5      | ..                   | ..       | N. W.                  | Ditto                |
| 30                                      | 29.555     | 75.5         | 78.0    | 66.5      | ..                   | ..       | N. E.                  | Ditto                |
| 31                                      | 29.533     | 74.0         | 74.0    | 70.0      | ..                   | ..       | E.                     | ~ all over           |
| Mean.                                   | 29.477     | 79.2         | 80.3    | 68.9      | ..                   | ..       | ..                     | ....                 |

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6.

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of October, 1854.*

| Observations at apparent Noon. |            |              |         |           |                      |          |                        |                      |
|--------------------------------|------------|--------------|---------|-----------|----------------------|----------|------------------------|----------------------|
| Date.                          | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |                        | Aspect of the Sky.   |
|                                |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Direction of the Wind. |                      |
| 1                              | 29.353     | 84.6         | 85.0    | 74.6      | ..                   | ..       | ..                     | ~ scattered          |
| 2                              | 29.367     | 88.7         | 89.5    | 74.8      | ..                   | ..       | N. W.                  | Clear [in zenith     |
| 3                              | 29.387     | 89.7         | 91.0    | 73.5      | ..                   | ..       | N. W.                  | ~ very few scattered |
| 4                              | 29.405     | 87.5         | 89.2    | 71.1      | ..                   | ..       | N. W.                  | Clear                |
| 5                              | 29.383     | 87.0         | 88.0    | 72.0      | ..                   | ..       | N. W.                  | ~ scattered          |
| 6                              | 29.373     | 84.8         | 85.4    | 77.6      | ..                   | ..       | N.                     | ~ all over           |
| 7                              | 29.309     | 79.8         | 78.5    | 76.6      | ..                   | ..       | N. E.                  | Ditto                |
| 8                              | 29.329     | 81.6         | 82.3    | 77.5      | ..                   | ..       | E.                     | Ditto                |
| 9                              | 29.391     | 85.3         | 85.3    | 78.5      | ..                   | ..       | S. E.                  | ~ scattered          |
| 10                             | 29.471     | 85.5         | 85.8    | 77.9      | ..                   | ..       | W.                     | Ditto                |
| 11                             | 29.417     | 83.5         | 83.9    | 74.5      | ..                   | ..       | N. W.                  | Ditto                |
| 12                             | 29.395     | 84.2         | 84.7    | 74.9      | ..                   | ..       | ..                     | Clear                |
| 13                             | 29.433     | 86.3         | 86.5    | 74.0      | ..                   | ..       | W.                     | Ditto                |
| 14                             | 29.503     | 85.5         | 86.6    | 71.9      | ..                   | ..       | W.                     | Ditto                |
| 15                             | 29.493     | 83.5         | 83.9    | 69.9      | ..                   | ..       | ..                     | Ditto                |
| 16                             | 29.513     | 84.5         | 85.5    | 64.4      | ..                   | ..       | N. W.                  | Ditto                |
| 17                             | 29.491     | 83.5         | 85.1    | 64.5      | ..                   | ..       | N. W.                  | Ditto                |
| 18                             | 29.475     | 82.3         | 84.2    | 65.7      | ..                   | ..       | N. W.                  | Ditto                |
| 19                             | 29.475     | 82.5         | 83.4    | 66.0      | ..                   | ..       | N.                     | Ditto                |
| 20                             | 29.505     | 81.7         | 83.0    | 65.0      | ..                   | ..       | N.                     | Ditto                |
| 21                             | 29.527     | 79.9         | 80.9    | 63.4      | ..                   | ..       | N.                     | Ditto                |
| 22                             | 29.493     | 79.0         | 79.5    | 63.5      | ..                   | ..       | ..                     | Ditto                |
| 23                             | 29.471     | 80.3         | 81.5    | 65.0      | ..                   | ..       | N.                     | Ditto                |
| 24                             | 29.501     | 79.0         | 80.3    | 64.2      | ..                   | ..       | N. W.                  | Ditto                |
| 25                             | 29.501     | 82.0         | 84.5    | 63.5      | ..                   | ..       | N. W.                  | Ditto                |
| 26                             | 29.495     | 80.7         | 81.3    | 63.5      | ..                   | ..       | N. W.                  | Ditto                |
| 27                             | 29.483     | 78.9         | 80.6    | 60.5      | ..                   | ..       | N. W.                  | Ditto                |
| 28                             | 29.523     | 77.5         | 79.0    | 59.5      | ..                   | ..       | N. W.                  | Ditto                |
| 29                             | 29.495     | 78.0         | 80.1    | 60.8      | ..                   | ..       | W.                     | Ditto                |
| 30                             | 29.481     | 80.0         | 81.1    | 67.8      | ..                   | ..       | E.                     | Ditto                |
| 31                             | 29.497     | 73.7         | 71.9    | 69.9      | ..                   | ..       | E.                     | ~ raining            |
| Mean.                          | 29.449     | 82.6         | 83.4    | 69.0      | ..                   | ..       | ..                     | ...                  |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of October, 1854.*

Maximum pressure observed at 4 P. M.

| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky. | Rain Gauges.                 |                        |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|--------------------|------------------------------|------------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                    | 3 Ft. 2 in. from the ground. | Direction of the Wind. |
| 1     | 29.303     | 90.2         | 90.7    | 95.5      | 90.5                 | 77.2     | 83.85 | ~ scattered        | ..                           | ..                     |
| 2     | 29.315     | 93.2         | 92.5    | 77.4      | 92.0                 | 76.7     | 84.35 | ~ scattered        | ..                           | N.W.                   |
| 3     | 29.319     | 94.0         | 94.2    | 73.9      | 93.8                 | 76.0     | 84.9  | Clear              | ..                           | N.W.                   |
| 4     | 29.333     | 93.0         | 93.4    | 71.5      | 93.0                 | 76.0     | 84.5  | Do. [wards W.      | ..                           | N.W.                   |
| 5     | 29.345     | 90.9         | 91.4    | 72.0      | 91.0                 | 75.8     | 83.4  | ~ scattered to-    | ..                           | N.W.                   |
| 6     | 29.269     | 88.3         | 88.3    | 78.2      | 88.0                 | 75.4     | 81.7  | ~ scattered        | ..                           | N.E.                   |
| 7     | 29.219     | 79.5         | 78.0    | 75.2      | 77.7                 | 75.0     | 76.35 | ....               | ..                           | E.                     |
| 8     | 29.225     | 86.0         | 86.3    | 77.0      | 86.0                 | 75.0     | 80.5  | Ditto              | ..                           | E.                     |
| 9     | 29.341     | 88.3         | 87.8    | 78.9      | 87.5                 | 75.6     | 81.55 | Ditto              | ..                           | S.E.                   |
| 10    | 29.399     | 89.5         | 89.5    | 78.4      | 89.0                 | 75.5     | 82.25 | Ditto              | ..                           | S.W.                   |
| 11    | 29.351     | 85.8         | 86.4    | 77.2      | 86.0                 | 74.0     | 80.0  | Ditto              | ..                           | N.W.                   |
| 12    | 29.347     | 88.2         | 87.7    | 74.4      | 88.5                 | 73.0     | 80.75 | ~ Ditto            | ..                           | N.W.                   |
| 13    | 29.391     | 90.8         | 91.0    | 72.9      | 90.6                 | 73.4     | 82.0  | Clear              | ..                           | W.                     |
| 14    | 29.459     | 90.9         | 91.4    | 70.0      | 91.0                 | 72.8     | 81.9  | Ditto              | ..                           | W.                     |
| 15    | 29.447     | 88.2         | 88.6    | 70.3      | 88.0                 | 69.0     | 78.5  | Ditto              | ..                           | ..                     |
| 16    | 29.471     | 88.5         | 88.0    | 65.5      | 88.9                 | 68.0     | 73.45 | Ditto              | ..                           | N.W.                   |
| 17    | 29.437     | 88.6         | 88.5    | 65.0      | 88.5                 | 67.4     | 77.95 | Ditto              | ..                           | N.W.                   |
| 18    | 29.405     | 87.7         | 88.1    | 67.3      | 88.0                 | 67.0     | 77.5  | Ditto              | ..                           | W.                     |
| 19    | 29.411     | 87.9         | 88.5    | 66.4      | 88.0                 | 68.5     | 78.25 | Ditto              | ..                           | N.W.                   |
| 20    | 29.455     | 86.8         | 87.6    | 67.4      | 87.5                 | 70.0     | 78.75 | Ditto              | ..                           | N.                     |
| 21    | 29.471     | 87.0         | 87.4    | 63.0      | 87.5                 | 69.6     | 78.55 | Ditto              | ..                           | N.W.                   |
| 22    | 29.443     | 86.0         | 86.6    | 63.7      | 86.5                 | 65.3     | 75.9  | Ditto              | ..                           | ..                     |
| 23    | 29.409     | 85.2         | 85.4    | 66.6      | 85.5                 | 64.0     | 74.75 | Ditto              | ..                           | N.W.                   |
| 24    | 29.445     | 85.0         | 85.8    | 64.5      | 85.4                 | 63.6     | 74.5  | Ditto              | ..                           | N.W.                   |
| 25    | 29.447     | 87.0         | 86.7    | 68.5      | 86.7                 | 64.7     | 75.7  | Ditto              | ..                           | N.W.                   |
| 26    | 29.417     | 86.6         | 86.3    | 63.2      | 86.4                 | 64.5     | 75.45 | Ditto              | ..                           | N.W.                   |
| 27    | 29.434     | 84.8         | 84.6    | 60.0      | 84.5                 | 63.0     | 73.75 | Ditto              | ..                           | N.W.                   |
| 28    | 29.477     | 83.0         | 82.4    | 62.2      | 82.7                 | 62.0     | 72.35 | Ditto              | ..                           | N.W.                   |
| 29    | 29.423     | 88.0         | 88.2    | 62.5      | 88.0                 | 61.0     | 74.5  | Ditto              | ..                           | N.W.                   |
| 30    | 29.443     | 84.0         | 83.8    | 68.5      | 84.5                 | 61.0     | 72.75 | Ditto              | ..                           | E.                     |
| 31    | 29.437     | 73.0         | 72.2    | 69.9      | 72.3                 | 63.0     | 67.65 | ~ scattered        | ..                           | ..                     |
| Mean. | 29.375     | 84.9         | 85.0    | 68.2      | 87.2                 | 69.7     | 78.49 | ....               | ..                           | ..                     |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of November, 1854.*

| Maximum pressure observed at 9.50 A. M. |            |              |         |           |                    |                   |                      |
|-----------------------------------------|------------|--------------|---------|-----------|--------------------|-------------------|----------------------|
| Date.                                   | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.   |
|                                         |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                      |
| 1                                       | 29.505     | 70.0         | 70.5    | 68.2      | E.                 | ..                | ✓ all over           |
| 2                                       | 29.471     | 73.5         | 74.5    | 69.0      | E.                 | ..                | ✓ scattered          |
| 3                                       | 29.497     | 71.5         | 70.9    | 67.5      | E.                 | ..                | ✓ all over           |
| 4                                       | 29.525     | 74.8         | 75.2    | 68.4      | N. E.              | ..                | ✓ very few scattered |
| 5                                       | 29.505     | 75.3         | 75.2    | 68.4      | N. E.              | ..                | ✓ all over           |
| 6                                       | 29.471     | 74.2         | 76.0    | 64.0      | N. W.              | ..                | ✓ scattered          |
| 7                                       | 29.525     | 70.5         | 71.2    | 61.2      | N. W.              | ..                | Clear                |
| 8                                       | 29.581     | 73.0         | 74.8    | 60.0      | N. W.              | ..                | Ditto                |
| 9                                       | 29.647     | 71.6         | 73.4    | 57.4      | N. W.              | ..                | Ditto                |
| 10                                      | 29.727     | 67.0         | 67.9    | 56.0      | N. W.              | ..                | Ditto                |
| 11                                      | 29.727     | 69.0         | 71.5    | 55.0      | N. W.              | ..                | Ditto                |
| 12                                      | 29.643     | 72.0         | 73.5    | 57.0      | N. W.              | ..                | Ditto                |
| 13                                      | 29.627     | 70.5         | 72.3    | 57.2      | N. W.              | ..                | Ditto                |
| 14                                      | 29.605     | 68.0         | 69.2    | 58.4      | N.                 | ..                | ✓ scattered          |
| 15                                      | 29.597     | 69.5         | 70.9    | 59.4      | S.                 | ..                | ✓ Ditto              |
| 16                                      | 29.647     | 72.0         | 73.5    | 61.5      | S. E.              | ..                | Ditto                |
| 17                                      | 29.652     | 69.5         | 70.9    | 57.5      | N. W.              | ..                | Clear                |
| 18                                      | 29.601     | 67.7         | 69.0    | 54.0      | N. W.              | ..                | Ditto                |
| 19                                      | 29.615     | 71.2         | 73.0    | 54.3      | N. W.              | ..                | Ditto                |
| 20                                      | 29.633     | 65.8         | 67.4    | 56.5      | N. W.              | ..                | Ditto                |
| 21                                      | 29.663     | 67.0         | 68.0    | 55.0      | N. W.              | ..                | Ditto                |
| 22                                      | 29.687     | 65.8         | 67.3    | 54.8      | S. W.              | ..                | Ditto                |
| 23                                      | 29.663     | 66.0         | 67.9    | 55.2      | N. W.              | ..                | Ditto                |
| 24                                      | 29.661     | 65.0         | 66.3    | 55.9      | N. W.              | ..                | Ditto                |
| 25                                      | 29.705     | 65.5         | 67.6    | 60.1      | N. E.              | ..                | Ditto                |
| 26                                      | 29.699     | 65.0         | 66.5    | 56.0      | N. E.              | ..                | Ditto                |
| 27                                      | 29.641     | 67.5         | 68.4    | 60.0      | N. E.              | ..                | Hazy                 |
| 28                                      | 29.607     | 65.5         | 66.6    | 57.0      | N. E.              | ..                | ✓ scattered          |
| 29                                      | 29.623     | 66.0         | 67.0    | 57.0      | N. W.              | ..                | Ditto                |
| 30                                      | 29.642     | 67.0         | 68.9    | 59.0      | N. E.              | ..                | Ditto                |
| Mean.                                   | 29.613     | 69.2         | 70.5    | 59.1      | ..                 | ..                | ...                  |

Note. The dry bulb and Maximum Register do not agree, the former always reads more than the latter, the average difference is 1.6.



*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra, for the Month of November, 1854.*

Observations at apparent Noon.

| Date. | Barometer. | Temperature. |         |           | Direction of Wind. | Quantity of Rain. | Aspect of the Sky.   |
|-------|------------|--------------|---------|-----------|--------------------|-------------------|----------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. |                    |                   |                      |
| 1     | 29.465     | 72.3         | 72.5    | 69.0      | E.                 | ..                | ~ all over           |
| 2     | 29.421     | 75.8         | 77.8    | 68.4      | E.                 | ..                | ~ scattered          |
| 3     | 29.465     | 72.0         | 72.0    | 67.0      | E.                 | ..                | ~ all over           |
| 4     | 29.487     | 77.0         | 77.9    | 67.4      | N. E.              | ..                | ~ very few scattered |
| 5     | 29.439     | 77.4         | 79.0    | 63.0      | N. W.              | ..                | Clear                |
| 6     | 29.455     | 78.5         | 80.3    | 64.0      | S. E.              | ..                | Ditto                |
| 7     | 29.505     | 75.4         | 76.4    | 63.5      | N. W.              | ..                | Ditto                |
| 8     | 29.559     | 77.0         | 78.6    | 60.0      | N. W.              | ..                | Ditto                |
| 9     | 29.637     | 75.7         | 76.3    | 58.4      | N. W.              | ..                | Ditto                |
| 10    | 29.715     | 73.9         | 75.4    | 58.0      | N. W.              | ..                | Ditto                |
| 11    | 29.695     | 74.8         | 76.2    | 56.5      | N. W.              | ..                | Ditto                |
| 12    | 29.611     | 75.5         | 77.0    | 58.0      | N. W.              | ..                | ~ scattered          |
| 13    | 29.601     | 76.3         | 77.5    | 58.5      | N. W.              | ..                | Clear                |
| 14    | 29.589     | 74.0         | 75.5    | 59.5      | N.                 | ..                | ~ scattered          |
| 15    | 29.569     | 75.8         | 77.5    | 61.6      | S. E.              | ..                | ~ Ditto              |
| 16    | 29.615     | 76.5         | 78.7    | 63.0      | N.                 | ..                | Ditto                |
| 17    | 29.615     | 77.0         | 78.0    | 57.0      | N. W.              | ..                | Clear                |
| 18    | 29.583     | 73.5         | 75.0    | 55.2      | N. W.              | ..                | Ditto                |
| 19    | 29.555     | 74.5         | 76.5    | 57.0      | N. W.              | ..                | Ditto                |
| 20    | 29.599     | 71.2         | 72.4    | 57.5      | N. W.              | ..                | Ditto                |
| 21    | 29.637     | 70.2         | 71.9    | 56.5      | N. W.              | ..                | Scattered            |
| 22    | 29.655     | 72.0         | 72.4    | 56.5      | S. W.              | ..                | Clear                |
| 23    | 29.625     | 71.5         | 73.0    | 57.1      | N. W.              | ..                | Ditto                |
| 24    | 29.637     | 70.5         | 71.3    | 60.0      | N. W.              | ..                | Ditto                |
| 25    | 29.671     | 70.2         | 72.7    | 60.9      | N. E.              | ..                | Ditto                |
| 26    | 29.639     | 70.0         | 72.2    | 60.0      | N. E.              | ..                | Ditto                |
| 27    | 29.607     | 71.0         | 71.2    | 61.1      | N. E.              | ..                | Hazy                 |
| 28    | 29.567     | 70.2         | 70.2    | 58.5      | N. E.              | ..                | ~ scattered          |
| 29    | 29.547     | 70.9         | 72.4    | 58.5      | N. W.              | ..                | Ditto                |
| 30    | 29.617     | 73.0         | 73.7    | 60.5      | E.                 | ..                | Ditto                |
| Mean. | 29.579     | 73.7         | 75.0    | 60.4      | ..                 | ..                | ....                 |

*Meteorological Register kept at the Office of the Secretary to Government, N. W. P. Agra. for the Month of November, 1854.*

Minimum pressure observed at 4 P. M.

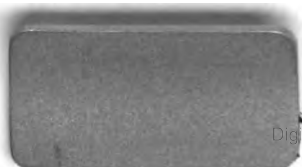
| Date. | Barometer. | Temperature. |         |           | Maximum and Minimum. |          |       | Aspect of the Sky.  | Direction of Wind. | Quantity of Rain. |
|-------|------------|--------------|---------|-----------|----------------------|----------|-------|---------------------|--------------------|-------------------|
|       |            | Of Mercury.  | Of Air. | Wet Bulb. | Maximum.             | Minimum. | Mean. |                     |                    |                   |
| 1     | 29.415     | 76.5         | 76.0    | 71.0      | 76.0                 | 63.5     | 69.75 | ~ all over          | E.                 | ..                |
| 2     | 29.361     | 79.5         | 79.5    | 69.2      | 79.3                 | 64.0     | 71.65 | ~ scattered         | E.                 | ..                |
| 3     | 29.427     | 74.0         | 73.9    | 68.2      | 73.5                 | 63.7     | 68.6  | ~ all over          | E.                 | ..                |
| 4     | 29.421     | 82.0         | 82.0    | 68.8      | 81.6                 | 63.0     | 72.3  | ~ very few scatter. | N.                 | ..                |
| 5     | 29.365     | 82.2         | 82.5    | 67.2      | 82.0                 | 66.0     | 74.0  | ~ scattered         | N.W.               | ..                |
| 6     | 29.379     | 81.9         | 80.7    | 64.0      | 81.4                 | 64.4     | 72.9  | Ditto               | S. E.              | ..                |
| 7     | 29.467     | 81.4         | 81.4    | 63.9      | 80.9                 | 62.0     | 71.45 | Clear               | N.W.               | ..                |
| 8     | 29.505     | 81.5         | 81.4    | 61.9      | 81.4                 | 59.0     | 70.2  | ~ scattered         | N.W.               | ..                |
| 9     | 29.597     | 80.5         | 80.0    | 58.0      | 80.4                 | 56.0     | 68.2  | Clear               | N.W.               | ..                |
| 10    | 29.659     | 79.7         | 79.2    | 57.5      | 79.4                 | 55.0     | 67.2  | Ditto               | N.W.               | ..                |
| 11    | 29.637     | 80.0         | 79.5    | 58.5      | 80.0                 | 55.2     | 67.6  | Ditto               | N.W.               | ..                |
| 12    | 29.591     | 78.8         | 78.5    | 58.4      | 78.3                 | 54.1     | 66.2  | ~ scattered         | N.W.               | ..                |
| 13    | 29.539     | 83.9         | 84.0    | 60.6      | 84.5                 | 55.2     | 69.85 | Clear               | N.W.               | ..                |
| 14    | 29.509     | 80.0         | 81.2    | 61.2      | 81.2                 | 54.6     | 67.9  | ~ scattered         | N.                 | ..                |
| 15    | 29.525     | 80.5         | 80.5    | 64.4      | 80.2                 | 60.0     | 70.1  | ~ Ditto             | S. E.              | ..                |
| 16    | 29.561     | 82.7         | 83.2    | 63.1      | 83.6                 | 61.5     | 72.55 | Clear               | N.W.               | ..                |
| 17    | 29.565     | 80.8         | 80.5    | 58.5      | 81.0                 | 61.0     | 71.0  | Ditto               | N.W.               | ..                |
| 18    | 29.509     | 78.9         | 78.9    | 57.3      | 78.9                 | 54.0     | 66.45 | Ditto               | N.W.               | ..                |
| 19    | 29.517     | 79.4         | 79.6    | 58.0      | 79.6                 | 54.2     | 66.9  | Ditto               | N.W.               | ..                |
| 20    | 29.535     | 76.1         | 76.4    | 58.7      | 76.0                 | 55.0     | 65.5  | Ditto               | N.W.               | ..                |
| 21    | 29.595     | 76.0         | 77.5    | 59.0      | 77.0                 | 53.2     | 65.1  | Ditto               | N.W.               | ..                |
| 22    | 29.601     | 77.9         | 78.5    | 57.9      | 78.5                 | 51.5     | 65.0  | Ditto               | N.W.               | ..                |
| 23    | 29.589     | 76.4         | 76.4    | 58.5      | 76.0                 | 51.0     | 63.5  | Ditto               | N.W.               | ..                |
| 24    | 29.583     | 74.8         | 74.4    | 61.3      | 75.0                 | 51.0     | 63.0  | Ditto               | S. E.              | ..                |
| 25    | 29.631     | 75.0         | 75.2    | 61.8      | 75.4                 | 52.5     | 63.95 | Ditto               | N. E.              | ..                |
| 26    | 29.577     | 75.8         | 76.5    | 60.5      | 75.4                 | 52.0     | 63.7  | Ditto               | N. E.              | ..                |
| 27    | 29.553     | 72.9         | 72.3    | 61.5      | 72.0                 | 53.5     | 62.75 | ~ all over          | N. E.              | ..                |
| 28    | 29.519     | 74.2         | 73.9    | 57.8      | 73.9                 | 52.0     | 62.95 | ~ scattered         | N.W.               | ..                |
| 29    | 29.525     | 74.5         | 73.7    | 60.0      | 74.9                 | 51.4     | 63.15 | ~ Ditto             | N.W.               | ..                |
| 30    | 29.549     | 76.0         | 76.0    | 61.3      | 76.5                 | 52.3     | 64.4  | ....                | ..                 | ..                |
| Mean. | 29.526     | 78.6         | 78.5    | 61.6      | 78.4                 | 56.7     | 67.6  | ....                | ..                 | ..                |

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